Bothalia

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Two parts of ten plates each are published annually. A volume consists of four parts. The publication is available in English and Afrikaans.

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Revision of the genus *Dombeya* (Sterculiaceae) in southern Africa

I. C. VERDOORN* and P. P. J. HERMAN*

Keywords: descriptions, *Dombeya,* key, revision, southern Africa

ABSTRACT

The species of *Dombeya* Cav. occurring in southern Africa are revised and a key is provided to the eight species present in the region. A new record for southern Africa, *D. quinqueseta* (Del.) Exell, is included.

INTRODUCTION

This revision is a contribution towards a treatment of the family Sterculiaceae for the *Flora of southern Africa.* The format followed is that previously used in the *FSA,* which differs in several respects from the current one and from that generally employed in *Bothalia.* Instead of recasting the work and so delaying publication of a much-needed revision of a well known genus of trees, it was decided to present the account in its original form.

Dombeya Cav., Diss. Bot. 2, App. 2 (1786); op. cit. 3: 121 (1787), nom. cons.; Harv. in FC 1: 220 (1860); Benth. & Hook. f., Gen. Pl. 1: 221 (1862); Arènes in Fl. Madag. 131, Sterculiaceae: 189 (1959); Wild in FZ 1: 518 (1961); M. Friedrich-Holzhammer *et al.* in FSWA 84: 2 (1969); Dyer in Gen. 1: 364 (1975). Lectotype species: *D. palmata* Cav.

Assonia Cav., Diss. Bot. 2, App. 2 (1786).

Xeropetalum Delile, Cent. Pl. Call. 4: 377 (1826).

Trees or, more often, lax to bushy shrubs, sometimes straggling; bark usually stringy; indumentum mainly of stellate or tufted, uni- or multicellular hairs, often lepidote and with simple, thick-walled or glandular hairs as well. *Leaves* simple, petioled, stipulate, usually palmately nerved (in African species). *Bracts* 3, caducous, pubescent on both surfaces, close to the calyx or scattered, usually free. *Calyx* 5-lobed, pubescent on outside, tube short, usually with 5 patches of papillae just below the base of the lobes within; lobes reflexed in mature flowers. *Petals* 5, in African species usually obliquely obovate, cuneate (butterfly-wing-shaped), white or in varying shades of rose, sometimes flecked or veined with purplish red or deep rose at the base, persistent, turning cinnamon-rufous with age. *Stamens* 10–40, usually 15, united at the base into a short tube; filaments of different lengths in groups of 3–8 (occasionally 2 or 4), alternating with 5 narrowly linear-spathulate staminodes; anthers oblong, the cells parallel, opening by slits. *Ovary* 3–5-celled, sutures often partly bristly pubescent inside; style 3–5-branched; ovules 2–8 in a cell. *Capsule* subglobose, loculicidally dehiscent. *Seeds* globose to obovate-oblong, triquetrous; testa hard, rough with minute ridges, dots or pits.

Native of Africa, Madagascar and the Mascarene Islands. In South Africa eight species and one variety are recognized.

For the conservation of the name and for the type species see the *International Code of Botanical Nomenclature* 1983, p.380. The genus was named in honour of J. Dombey, a French botanist who travelled in Chile and Peru in the late eighteenth century.

KEY TO SPECIES

1a Petals over 1 cm long: ovary usually 5-celled; style branches usually 5:

2a Pubescence on branchlets, petioles and peduncles usually distinctly stellate-pubescent, sometimes hairs spreading but then mostly under 1 mm long, not glandular; leaves 3–10 cm long, 2–3 cm broad ..... 1. *D. tiliacea*

2b Pubescence on branchlets, petioles and peduncles of long, spreading hairs, glandular and/or non-glandular and acute, mostly over 1 mm long; leaves large, 6–23 cm long, 5–19 cm broad:

3a Leaves distinctly discolourous, lower surface metallic-grey with a short dense indumentum of fine hairs giving it a felted appearance; pubescence often of predominantly glandular, light brown, spreading hairs..... 2. *D. pulchra*

3b Leaves not obviously discolourous or if somewhat so the indumentum on the lower surface sparsely stellate to densely stellate-tomentose; pubescence usually mainly of non-glandular, acute, spreading hairs..... 3. *D. burgessiae*

1b Petals under or up to 1 cm long; ovary usually 3-celled; style branches usually 3:

4a Leaves ovate to broadly ovate, gradually narrowing in the upper third or obscurely 3-lobed, the central lobe the largest; lobes obtuse or the central one acuminate:

5a Leaves rather thin in texture, acuminate at the apex, reticulate veins on the lower surface not very conspicuous and prominently raised:

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6a Leaves mostly under 7 × 6 cm; pubescence on the peduncles stellate with short (± 1 mm) hairs ..... 4. *D. cymosa*

6b Leaves variable in size up to 11 × 10,5 cm; pubescence on pedicels and peduncles mostly stellate-tomentose intermixed with long (up to 1,5 mm), thin, acute spreading hairs ..... 5. *D. kirkii*

5b Leaves thick in texture, the upper third not acuminate into a narrow apical portion, leaves sometimes appearing shallowly 3-lobed, lobes rounded, reticulate veins on lower surface conspicuous and prominently raised ..... 6. *D. quinqueseta*

4b Leaves suborbicular to broadly ovate, broadly rounded at the apex, sometimes acute but never acuminate in the upper third:

7a Trees or shrubs with very rough bark; in shrubby form rough bark only on the lower portion of the plant; usually flowering in early spring on more or less leafless branches except on the central plateau of South West Africa/Namibia where they flower at any time from spring to autumn depending on rains:

8a Ovary tomentellous with stellately pubescent scales as well as setose with tufted bristle-like suberect hairs ..... 7a. *D. rotundifolia* var. *rotundifolia*

8b Ovary tomentose with dense, stellately pubescent scales, the hairs short, not setose; tall shrubs with a few long virgate stems; leaves velvety stellate-tomentose; restricted to the Naukluft area of South West Africa/Namibia, near permanent water ..... 7b. *D. rotundifolia* var. *velutina*

7b Shrubs with several to many slender stems, rarely a small tree; bark never rough; usually flowering in autumn; ovary stellate-tomentose with short hairs (not setose as well); restricted to mesophytic areas in the mountainous north-eastern Transvaal ..... 8. *D. autumnalis*

1. **Dombeya tiliacea** *(Endl.) Planch.* in Fl. des Serres, sér. 1, 6: 225 (1850–51). Type: Cape, *Drège s.n.* (P!).

Xeropetalum tiliaceum Endl. & Fenzl, Nov. Stirp. Decad. 43 (1839). *Leeuwenhoekia tiliacea* E. Mey. ms. *Dombeya dregeana* Sond. in Linnaea 23: 18 (1850); Harv., Thes. Cap. 1: 56, t. 89 (1859); FC 1: 221 (1860); K. Schum. in Engl., Monogr. Afr. Pfl. 5: 30 (1900); Sim, For. Fl. Cape Col. 45 (1907).

D. natalensis Sond. in Linnaea 23: 17 (1850); Harv. in FC 1: 221 (1860); Wood, Natal Pl. 73, pl. 90 (1899); K. Schum. in Engl., Monogr. Afr. Pfl. 5: 29 (1900); Sim, For. Fl. Cape Col. 146 (1907). Type: Port Natal, *Gueinzius 105* (SAM, iso.).

D. gracilis K. Schum. in Engl., Monogr. Afr. Pfl. 5: 30 (1900). Type: Natal, Umvoti, *MacOwan & Bolus in Herb. Norm. 562* (BOL).

D. elegans K. Schum. in Engl., Monogr. Afr. Pfl. 5: 31 (1900), nom. illegit., pro parte as to *Flanagan 1409* (STE), non Cordem. (1895).

Shrub, sometimes straggling, 2–3 m high or tree up to 10 m tall. *Branchlets* slender, longitudinally ridged, with prominent leaf-scars and with small, pale, raised lenticels, glabrescent but new growth laxly to densely stellate-pubescent with patent or appressed hairs rarely up to 1 mm long. *Stipules* early caducous, linear-subulate from a rather broad base, (rarely deltoid to narrowly deltoid-long-acuminate), sparsely to densely stellate-pubescent, glabrescent, sometimes subpetaloid. *Leaves* often thin in texture, ovate, gradually acuminate, sometimes 3-lobed at the apex, the 2 lateral lobes shallow, 3–10 cm long, 2–8 cm broad, shallowly to deeply cordate, rarely rounded or subtruncate at the base, margins crenate to crenate-dentate, the lateral veins running to the point of the tooth but not clearly excurrent, nerves from the base 3–7 but usually 5, upper and lower surfaces thinly to densely stellate-pubescent, often glabrescent, hairs sometimes longer and some simple on the lower surface; petiole 2–6,5 cm long, usually subspreading, stellate-pubescent and with simple spreading hairs, usually under 1 mm long, glabrescent. *Inflorescence* cymose to subumbellate, usually appearing in late summer or autumn in the axils of the upper leaves, 2–9-flowered; peduncle usually straight, 1,5–8 cm long, stellate-pubescent and sometimes with simple hairs as well, hairs usually under 1 mm long; pedicels 1,5–3 cm long, pubescent like the peduncle. *Buds* ovate or spindle-shaped. *Bracts* 3, free, early caducous, variable in size and shape from broadly ovate to narrowly linear, 5,5–10 mm long, 1–4 mm broad, gradually and shortly acuminate at the apex or abruptly acuminate into a caudate apical third, margins sometimes with an odd lobe or two, shortly stellate-pubescent on both surfaces, the broad bracts usually close to the rounded base of the calyx and the narrower ones at the base of the stipe. *Calyx* lobed almost to the base, united portion 2,5 mm long, rounded at the base or with a short or long stipe, up to 4 mm long; lobes usually reflexed, narrowly oblong-acuminate, about 9–15 mm long, 2,5–4 mm broad, pubescent dorsally. *Petals* persistent, white (rarely pink) turning rust-coloured with age, oblique, cuneate, about 12–17 mm long, 11–16 mm broad at the apex. *Stamens* united at the base into a tube 2–4,5 mm long; filaments of different lengths, the longest about 4 mm long; anthers 2–3,5 mm long; staminodes about 11 mm long. *Ovary* tomentose and with a few projecting hairs in the apical portion, but these hairs usually under 1 mm long, 5-celled but sometimes imperfectly so; ovules 2–4 per cell; style 8–10 mm long, 3–5-branched at the apex, glabrous or stellate-pubescent in lower half. *Capsule* about 7 mm long, stellate-tomentose, hairy on the sutures within; seed 3-sided and broadly rounded at the top, about 5 × 7 mm, rough, with minute ridges and dots.

Found in bush, mixed scrub, coastal short forest or subtropical scrub forest. Recorded from the eastern Cape and Natal.

CAPE.—Albany: 'Kleinemund', *MacOwan 568* (BOL). Bathurst: Port Alfred, *Galpin 5*; *Britten 1427*. Butterworth: *Acocks 12539*. East London: *Comins 1512*; *Rogers 17017*; *Smith 3745*. Kentani: *Pegler 359*. Komga: *Flanagan 56*. Peddie: *Acocks 12779*.

NATAL.—Without precise locality, *Cooper 1105*. Durban: *Medley Wood 10973*; 'Port Natal', *Ecklon & Zeyher s.n.* (SAM); *Gueinzius s.n.* (SAM). Estcourt: Entumeni, *Medley Wood 3745* (NH); Hlatikulu Forest, *Killick 1956*. Hlabisa: St Lucia, *Ward 3127*. Ixopo: *Taylor 2098*. Kranskop: Jameson's Drift, *Dyer 4370*. Lions River: Howick, *Schlechter 6793*. Lower Tugela: near Umvoti River, *Adlam in Herb. Norm. 562*. Nkandhla: Nsuze Valley, *Codd 9681*. Pietermaritzburg: Table Mountain, *Killick 106*. Port Shepstone: *McClean 474*. Umzinto: *Rudatis 1370*.

In the Flora Capensis the specimens here included in one species were separated into two species on the width of the epicalyx bracts and the shape of the buds. Those with broad bracts were named *D. dregeana* and were supposed to occur in the Cape Province, whereas those with narrow bracts and 'more fusiform buds' were named *D. natalensis*. However, the bracts vary in width, and several intermediates between the two extremes can be found. Although the epicalyx bracts are early deciduous, a study of many herbarium specimens has shown that the broader bracts are usually borne just below the rounded base of the calyx whereas the narrower bracts are borne slightly lower. Bract-scars can give a clue as to whether the bracts were broad or not. It appeared that some specimens with broad, and some with narrow bracts, occurred both in the Cape and Natal. The impression was gained that the broad bracts usually occur on specimens growing in bush in dry country and the narrow ones on trees in forests and that these characters are therefore not specific but rather indicate ecotypes.

Originally Drège gave the manuscript name *Leeuwenhoekia tiliacea* to both his Cape and Natal specimens, showing that he considered them to be one species. In the *Flora Capensis,* Drège's Cape material is put under *D. dregeana* and the Natal specimens under *D. natalensis*.

2. **Dombeya pulchra** *N.E. Br.* in Kew Bull. 97: 142 (1895); Burtt Davy, Fl. Transv. 1: 259 (1926). Type: Barberton, *Galpin 804* (K, holo.; PRE, iso.; SAM; BOL).

Shrub, 1–4 m high, sometimes a fairly large tree up to 7 m tall. *Branches* longitudinally ridged, not very stout, fairly smooth; bark stringy; pith soft; branches laxly to very densely pubescent with light brown, more or less patently spreading, glandular hairs over 1 mm long. Very occasionally a specimen has a few acute, non-glandular hairs intermixed, or rarely, pubescence entirely of non-glandular, acute, patent hairs. *Stipules* subovate-oblong or linear-acuminate, about 10–16 mm long, 2–6 mm broad, felted on both sides with a short velvety pubescence sometimes with a few long or glandular hairs along the margins. *Leaves* with blade broadly ovate, about 6,5 × 6 to 25 × 9,5 cm, deeply cordate at the base, broadly acuminate, sometimes 3-, rarely 5-lobed in the upper half, obscurely to shallowly crenate-dentate on the margins, distinctly discolourous, upper surface with a lax to dense, short, stellate pubescence, lower surface always metallic-grey, felted with a short velvety pubescence, 5–7-palmately nerved, veins slender, prominent on lower surface; petiole 3–16 cm long, sparsely to densely pubescent with light brown, patent, glandular hairs, rarely with pointed non-glandular hairs mixed, or dominant (specimen of hybrid origin?), usually thicker than the peduncle, longer or shorter than the peduncle. *Inflorescence* cymose, axillary in upper leaves, 2–17-flowered; peduncle 4–14 cm long, sparsely to densely glandular hairy; pedicels up to 2,5 cm long, similarly hairy. *Bracts* inserted at or very near the calyx base, ovate, narrowly ovate-oblique, oblong or narrowly oblong, 5–16 mm long, 2–8 mm broad, shortly acuminate to a subacute or caudate apex, cordate, rounded or somewhat cuneate at the base, tomentose with stellate or tufted hairs, often shortly and densely so, giving a felted appearance, sometimes hairs longer and shaggy. *Calyx* rounded at the base or with a short stipe up to 2 mm long, rarely longer; lobes 8–18 mm long, gradually acuminate from the 1,5–5 mm broad base, stellate-tomentose dorsally, sometimes hairs short and dense giving a felted appearance. *Petals* mostly white, sometimes creamy or pink and some flowers with purplish-rose markings at the base of the petals, persistent, turning light cinnamon-rufous with age, about 12–20 mm long, 11–20 mm broad near the apex. *Stamens* united at the base for about 3 mm, filaments of different lengths, up to about 4 mm; anthers about 3,5 mm long; staminodes about 10 mm long. *Ovary* about 3 mm long, 2,5 mm broad; velvety tomentose with a few slightly longer tufted hairs showing; style about 8 mm long, pubescent at the base, branches 5, strongly recurved, about 3,5 mm long; cells 5, walls thin, with up to 6 ovules in each cell. *Capsule* 7–10 mm long, about 7 mm broad, with a short dense stellate tomentum intermixed with longer tufted hairs (but these hairs under 1 mm long), pubescent on the sutures within; seeds brown, pitted.

Found in the cooler regions with a fairly high rainfall, on rocky hills, in tall grass with scattered shrubs, on the edge of kloofbush or in damp places on banks of streams. Recorded from Swaziland and the eastern Transvaal mountainous country.

SWAZILAND.—Mbabane: near Dalriack, *Bolus 11716* (BOL); Valley, *Compton 25024*. Pigg's Peak: Komati Bridge, *Compton 30050*.

TRANSVAAL.—Barberton: Rimer's Creek, *Galpin 804*; Louws Spruit, *Bolus 7681* (BOL); Highlands Creek, *Clarke 55*. Belfast: Waterval Boven, *Rogers sub TRV 14772*. Carolina: Waterval Onder, *Rogers sub TRV 2351*. Lydenburg: *Wilms 78*; Uitsoek, *Codd & Verdoorn 10507*. Nelspruit: Numbi, *Van der Schijff 3052*. Pilgrims Rest: Marieps Kop, *Van der Schijff 4581*.

This species closely resembles *D. burgessiae* and the areas of distribution of the two species overlap in part, but *D. pulchra* is restricted to the cooler regions with higher rainfall in the eastern Transvaal and Swaziland. *D. burgessiae* is widespread, from the Natal coast through Swaziland and the eastern Transvaal to the tropics. A few intermediate or hybrid specimens were seen from localities in which the areas of distribution overlap.

3. **Dombeya burgessiae** *Gerrard ex Harv.* in FC 2: 590 (1862); Harv., Thes. Cap. 2: 24, t. 137 (1863); Hook. f. in Bot. Mag. 21: t. 5487 (1865); Mast. in FTA 1: 228 (1868); K. Schum. in Engl., Monogr. Afr. Pfl. 5: 28 (1900); Sim, For. Fl. P.E.A. 20, pl. 8 (1909); Burtt Davy, Fl. Transv. 1: 260 (1926); Wild in FZ 1: 522 (1961). Syntypes: Natal, Zululand, *McKen s.n.* (not seen); Klip River, *Gerrard s.n.* (TCD).

Assonia burgessiae (Gerrard ex Harv.) Kuntze, Rev. Gen. 1. 76 (1891).

Dombeya burgessiae var. *crenulata* Szyszyl., Polypet. Thalam. Rehm. 137 (1887). Syntypes: Natal, Newcastle, *Rehmann 7034, 7049* (not seen); Drakensberg, *Rehmann 7078* (not seen). *D. elegans* K. Schum. in Engl., Monogr. Afr. Pfl. 5:31 (1900); Burtt Davy, Fl. Transv. 1: 260 (1926), nom. illegit., pro parte as to *Nelson 531* (PRE), non Cordem. (1895).

D. rosea Bak.f. in J. Linn. Soc. (Bot.) 40: 29 (1911). Type: Rhodesia [Zimbabwe], *Swynnerton 196* (BM, holo.; K; SRGH).

Shrub, 1–4 m high with several to many stems, sometimes a slender tree. *Branches* stout, longitudinally ridged with fairly prominent leaf scars and many lenticels, more or less pubescent; ultimate branchlets comparatively slender, patently pubescent with a mixture of long, pointed, multicellular, thin-walled hairs and obtuse, glandular, multicellular hairs, hairs mostly over 1 mm long, single or two to several from the same base. *Stipules* variable, broadly ovate-acuminate from a broad subcordate base, narrowly oblong-acuminate, or narrowly lanceolate-acuminate, 1–1,7 cm long, 3–8 mm broad, densely to sparsely pubescent, glabrescent, from rather thick-textured and dark brown to fairly thin-textured and light brown. *Leaves* broadly ovate, 6–20 cm long, 5–19 cm broad, deeply cordate at the base, usually 3–5-lobed, sparsely to very densely pubescent with stellate and tufted hairs, lower surface usually more densely so than the upper, 5–7-palmately nerved, margins irregularly and unequally crenate to crenate-dentate; petiole 2–15 cm long, mostly thicker than the peduncles, ± 1,5–2 mm long, usually sparsely to densely patently pilose at least in part, with multicellular, non-glandular, pointed hairs mixed to a greater or lesser degree with glandular hairs. *Inflorescence* cymose, axillary, 2- to several-flowered; peduncle longer or shorter than the subtending petiole and usually slightly more slender, 2–14 cm long, similarly pubescent, branched in the upper half; pedicels up to 3 cm long. *Bracts* 3, free to the base, early caducous, variable in size, shape and pubescence, narrowly or broadly oblong to ovate-subcordate, shortly acuminate to an acute or shortly caudate apex, 9–15 mm long, 3–8 mm broad, pubescent on both surfaces, shortly tomentose or less densely covered with stellate and long tufted hairs, inserted close to the calyx base or up to 1,5 mm distant. *Calyx* lobed almost to the base, the united portion (about 1,5 mm long) consolidated with the ovary base which is rounded or with a short stipe; lobes about 14 mm long, acuminate from a 3–4 mm wide base, dorsally pubescent. *Petals* white or pale pink, sometimes with a rose-pink centre, persistent, turning light brown with age, up to 20 mm long, 18 mm broad at the apex. *Stamens* united at the base for 2–4 mm, filaments of various lengths, up to 4,5 mm long; anthers 3–4 mm long; staminodes 10–13 cm long, 2 mm broad in upper half. *Ovary* about 6×6 mm, stellate-tomentose to hirsute with tufted hairs, normally 5-celled; style 8–14 mm long, glabrous or partly to wholly stellate-tomentose, 3–5-branched; ovules 3–4 in a cell. *Capsule* about 10 mm long, 8 mm broad, stellate-tomentose to hirsute with tufted hairs (hairs about 1 mm or more long), pubescent on the sutures within.

Found at forest margins, edge of bush, on wooded stream banks, in kloofs, on grassy slopes with tall grass and in marshy ground, or on rocky dolerite hillsides under trees. Recorded from Natal, Swaziland and the eastern and northern Transvaal; also found in tropical Africa from Mozambique and Zimbabwe to Kenya.

NATAL.—Durban: Berea, *Medley Wood 11094.* Estcourt: Tabamhlope, *West 1086.* Hlabisa: *Codd 9612*; Hluhluwe Game Reserve, *Ward 2202.* Ingwavuma: *Codd & Dyer 2838.* Klipriver: *Gerrard 465* (NH); Grobbelaars Kloof, *Acocks 1002.* Mtonjaneni: Melmoth, *Lawn 1949* (NH). Newcastle: *Rehmann 7034* (BOL). Nongoma: *Gerstner 3910.* Richmond: Waterfall, *Thode A. 1203.*

SWAZILAND.—Hlatikulu, *Stewart sub TRV 10089.*

TRANSVAAL.—Barberton: near Kobinja, *Codd 7806.* Letaba: 'Houtbosch', *Rehmann 6321* (BOL); Duiwelskloof, *Scheepers 262; Galpin 11385;* Modjadjies, *Krige 105;* Dublin Mine, *Miller 4262.* Lydenburg: Erasmus Pass, *Strey 3721.* Messina: *Pole Evans 1447.* Pietersburg: Blaauwberg, *Codd 7956.* Piet Retief: Mooihoek, *Devenish 1022.* Sibasa: Tshakhoma, *Van Warmelo 5157/19;* Punda Milia, *Van der Schijff 973.* Soutpansberg: Wylies-poort, *Hutchinson 2059;* near Louis Trichardt, *Meeuse 10209.*

For the relationship with *D. pulchra* see the notes under that species.

In the Natal Herbarium there is a specimen, *West 1976* from Mapumulo, Tugela, which seems to be a hybrid between this species and *D. tiliacea*; in cultivation one finds plants which resemble *D. burgessiae* but do not agree exactly with it or with any other South African species. They are probably cultivars of *D. burgessiae.* Nurserymen sometimes use the names *D. rosea* and *D. calantha* for pink-flowered cultivated Dombeyas. Specimens seen to date in gardens are not at all like those species. *D. rosea* Bak.f., from Zimbabwe, is a synonym of *D. burgessiae,* whereas *D. calantha* K. Schum., from Malawi, is described as having very large, coarsely crenate leaves and the flowers borne on long brown-tomentose pedicels.

4. **Dombeya cymosa** *Harv.* in FC 2: 589 (1862); K. Schum. in Engl., Monogr. Afr. Pfl. 5:33 (1900); Sim, For. Fl. Cape Col. 145, pl. 18, Fig. 4 (1907); Wild in FZ 1: 527 (1961). Type: Eastern Cape, Kaffraria, *Bowker 216* (TCD, holo.; PRE, fragment).

Small tree or shrub, about 3 m tall, sometimes up to 8 m tall, occasionally a straggling bush about 1,3 m tall. *Branchlets* slender, woody, glabrous, or new growth with short, massed, stellate hairs, faintly longitudinally ridged, leaf-scars fairly prominent, lenticels small, raised, more or less circular. *Stipules* early deciduous, linear-subulate, 2–7 mm long, densely stellate-pubescent to glabrescent, thick to subpetaloid in texture. *Leaves* rather thin in texture, ovate, gradually narrowing in the upper third and then abruptly acuminate towards the apex, rounded or shallowly cordate at the base, not very large, usually under 70 mm long and 60 mm broad, crenate on the margin, sparsely and coarsely stellate-pubescent on both surfaces, glabrescent; hairs short; petioles on flowering branches up to 35 mm, sparsely to densely stellate-pubescent. *Inflorescence* cymose-corymbose to subumbellate, 3–12-flowered, axillary in the upper leaves of the main branches and the many short lateral branchlets; peduncles slender, 1–3 cm long, coarsely stellate-tomentose; pedicels varying from 2 to 7 mm long, coarsely stellate-tomentose with hairs short and appressed. *Bracts* 3, scattered on the pedicels, often distant from the calyx and from each other or 2 about midway, subopposite, early caducous, linear-subulate, densely stellate-pubescent, 1–2 mm long. *Calyx* lobed almost to the subrounded base, united for about 1 mm, stellate-pubescent without, sometimes glabrescent; lobes 4–5 mm long, 1,5–2 mm broad, usually reflexed in mature flowers. *Petals* white, turning rusty brown

with age, persistent, 6–8 mm long, 4–5 mm broad near the apex. *Stamens* united at the base for less than 1 mm, free portion varying slightly in length, the longest about 4 mm long; anthers 0,75 mm long; staminodes up to 5 mm long. *Ovary* appressedly stellate-tomentose, suboblate, about 1,5 mm long, 2 mm diam., 3- or rarely 4-celled; style about 1,5 mm long, branches 3, sometimes 4, about 3 mm long, rather thick and revolute; ovules usually 2 in a cell, smooth, hard, yellow. *Capsule* 4 mm long, 3,5 mm in diameter, stellate-tomentose with short hairs (under 1 mm long); seeds usually only one developing and filling the capsule, rough with raised lines.

Found on river and stream banks, forest margins, short closed woodland, stony slopes in gorges or dry valley bushveld scrub. Recorded from the eastern Cape, Natal, Swaziland and the eastern Transvaal; also found in Mozambique and Malawi.

CAPE.—Butterworth: *Pegler 770.* East London: *Pearson 7363*; *Rattray 274* (GRA). Elliotdale: 'Krelis Country', *Bowker 216.* Komga: *Flanagan 58*; Kei Cutting, *Barker 9253* (NBG). Queenstown: Junction Farm, *Galpin 8077.* Stutterheim: Kei Valley, *Acocks 9684.* Tsolo: Tsitsa Waterfall, *Galpin 6587* (GRA; BOL).

NATAL.—Dundee: *Codd 2414.* Durban: *Medley Wood 6438.* Hlabisa: False Bay, *Ward 3670;* Hluhluwe Game Reserve, *Ward 2291.* Ixopo: *Huntley 356.* Kranskop: Mambula, *Dyer 4348.* Port Shepstone: Oribi Flats, *McClean 398.* Ubombo: *Strey 5286.* Umvoti: *Edwards 2757.* Weenen: *Acocks 10144.*

SWAZILAND.—Stegi, *Ben Dlamini in Herb. Compton s.n.*

TRANSVAAL.—Nelspruit: Malelane, *Codd 5258.* Pilgrims Rest: Mariepskop, *Van der Schijff 5502.*

In some keys to this genus the distinguishing character between this species and *D. kirkii* is given as 'stamens 2 per fascicle' as opposed to 'stamens 3 per fascicle'. In the South African specimens most of the flowers dissected had 2, 3 and sometimes 4 stamens in a fascicle.

It is reported that honey produced by bees visiting these plants is excellent.

5. **Dombeya kirkii** *Mast.* in FTA 1: 227 (1868); K. Schum. in Engl., Monogr. Afr. Pfl. 5: 39 (1900); Sim, For. Fl. P.E.A. 20 (1909); Wild in FZ 1: 527 (1961). Syntypes: 'Nyassaland', *Meller s.n.* (K); Mozambique, Lupata Gorge, *Kirk s.n.* (K).

D. gilgiana K. Schum. in Engl., Pflanzenw. Ost.-Afr. C.270, t. 30 (1895). Syntypes: 'Tanganyika', Mschusas Dorf, *Holst 8993; 9171a* (K).

Shrub 1–5 m tall (in the tropics sometimes a tree up to 10 m tall). *Branchlets* woody, faintly longitudinally ribbed with scattered lenticels and prominent leaf-scars; young branches densely stellate-pubescent. *Stipules* 4–8 mm long, narrowly linear, thick or thin in texture, sometimes with incurved margins, stellate-pubescent with interspersed glandular hairs. *Leaves* ovate, gradually narrowing in the upper third, the apex abruptly acuminate, 4–12 cm long, 3–11 cm broad, crenate on the margins, cordate at the base, 5–9-nerved from the base (nerves tomentose) stellate-pubescent on both surfaces, hairs short and appressed, wearing off with age; petiole 1–6 cm long, stellate-tomentose. *Inflorescence* a cymose panicle, short or elongated, axillary and clustered at the apices of the branchlets, usually appearing from February to May, pubescent with the characteristic patent hairs; peduncle 1,5–8 cm long, stellate-tomentose interspersed with long, patent pointed hairs; pedicels usually 0,5–1,5 cm long, sparsely to densely patently pubescent as well as tomentose. *Bracts* 3 at the base of the calyx, linear to linear-elliptic (that is narrowing slightly to base and apex), sometimes conduplicate, shortly tomentose on both surfaces, the outer also bristling with long patent hairs, 5–7 mm long, 1–1,5 mm broad at the middle. *Calyx* rounded at the base, united for about 1,5 mm; lobes 5–7 mm long, 1,5–2 mm broad at the base, dorsally tomentose and usually patently hairy as well. *Petals* white turning light brown with age, persistent, 8–10 mm long, 4,5–5 mm broad just above the middle. *Stamens* united for 1–1,5 mm, 3 rarely 2 between the staminodes; filaments of different lengths, very slender, up to 4 mm long; anthers 1 mm long; staminodes very slender, 7 mm long. *Ovary* 3-celled, 2,5 mm long, 2,5 mm broad, tomentose and with long erect hairs at the apex, hairs up to 1 mm long; style about 2–3,3 mm long, sparsely hairy near base or sometimes altogether pubescent, branches suberect or slightly recurved, about 3 mm long; ovules usually 2 in a cell. *Capsule* 4×3 mm, with tufted setose hairs at the apex, hairs about 1 mm long.

Found on dry river banks in the north-eastern corner of the Transvaal; also recorded northwards as far as Kenya.

TRANSVAAL.—Sibasa: Pafuri, *Van der Schijff 3045; 3810; Van der Schijff & Marais 3715.*

The stems are said to be used by the Masai for making bows. Of the tropical African species that are considered to be synonymous by certain authors, only *D. gilgiana* is included here. This is because no material of the other synonyms has been seen, whereas the plate accompanying the original description of *D. gilgiana* clearly represents *D. kirkii.*

6. **Dombeya quinqueseta** *(Del.) Exell* in J. Bot., Lond. 73: 263 (1935). Type: *Cailliaud in Herb. Del.* (MPU; not seen).

Xeropetalum quinquesetum Del., Cent. Pl. Afr. 84 (1826).

Dombeya reticulata Mast. in FTA 1: 228 (1868). *Assonia reticulata* (Mast.) Kuntze, Rev. Gen. Pl. 1: 85 (1896). Type: Nile Land, *Spike & Grant s.n.* (K).

Assonia cuanzensis Hiern, Cat. Afr. Pl. Welw. 1: 86 (1896). *Dombeya cuanzensis* (Hiern) K. Schum. in Engl., Monogr. Afr. Pfl. 5: 40 (1900). Syntypes: Angola, Pungo Andongo, *Welwitsch 4735; 4736* (BM!).

Assonia huillensis Hiern, Cat. Afr. Pl. Welw. 1: 85 (1896). *Dombeya huillensis* (Hiern) K. Schum. in Engl., Monogr. Afr. Pfl. 5: 35 (1900). Syntypes: Angola, Huilla, near Quipungo, *Welwitsch 4726* (BM); near Lopollo, *Welwitsch 4727* (BM); *4728* (BM).

D. myriantha K. Schum. in Engl., Monogr. Afr. Pfl. 5: 33, t.2,A (1900). Type: Angola, *Buchner 527* (B†).

D. cuanzensis sensu K. Schum. in Warb., Kunene-Samb. Exped. Baum 301 (1903), non (Hiern) K. Schum.

D. melanostigma K. Schum. ex Engl. in Engl., Pflanzenw. Afr. 3,2: 428 (1921), nom. nud.

D. rotundifolia sensu Exell in J. Bot. 65, Suppl. Polypet. 42 (1927), pro parte quoad spec. *Gossweiler 1747,* non Harv.

Shrub or small tree up to about 5 m tall. *Branchlets* woody, brown to reddish brown, minutely stellate-pubescent when young, glabrescent, with a few scattered lenticels and prominent leaf-scars. *Stipules*

apparently early deciduous. *Leaves* ovate, sometimes shallowly 3-lobed, cordate to deeply cordate at base, up to 14 cm long and 20 cm broad, margin faintly dentate, 5–7-nerved from the base, upper surface stellate-pubescent, densely so on main and secondary veins, lower surface densely stellate-tomentose when young, pubescence less dense with age, reticulate veins on lower surface conspicuous and prominently raised; petiole up to 7,5 cm long, stellate-tomentose. *Inflorescence* of dense axillary cymes on old branches; peduncles up to 6 cm, densely stellate-tomentose; pedicels up to 10 mm long, densely stellate-tomentose. *Bracts* 3, at the base of the calyx, whorled or 1 at base of calyx and 2 lower down, subopposite, linear, 3 mm long, not more than 0,5 mm broad, densely stellate-tomentose on outside, glabrous inside. *Calyx* rounded at the base, united for 1–2 mm; lobes 5–7 mm long, 1–2 mm broad near base, dorsally densely stellate-tomentose. *Petals* white, turning yellow to light brown with age, shaped like the wings of a butterfly, up to 10 mm long and 6 mm broad. *Stamens* 15, united for 0,5 mm at the base; staminodes 5, linear, up to 8 mm long; fertile stamens in 5 groups of 3 each alternating with the staminodes; filaments of different lengths, up to 4 mm long; anthers 1 mm long. *Ovary* depressed globose, 3 mm in diameter, 2,5 mm long, tomentose with long erect hairs at the apex, 3-celled with 2 ovules in each cell; style 2–2,5 mm long; branches 2–2,5 mm long, recurved. *Fruit* not seen.

Found in the Okavango area of South West Africa/Namibia and northwards through Angola to Kenya, Uganda and Ethiopia.

S.W.A.—Grootfontein: *Barnard 194.*

7. **Dombeya rotundifolia** *(Hochst.) Planch.* in Fl. des Serres, sér. 1,6: 225 (1850–51). Type: Natal, Pietermaritzburg, *Krauss 252* (BM, iso.).

Tree or shrub, 2–10 m tall; stems with rough bark. *Stipules* caducous, narrowing from a triangular base into a linear-subulate upper portion, stellate-pubescent. *Leaves* more or less orbicular, rarely very broadly ovate, 2–8 cm long, 1,8–9 cm broad (larger on sterile branches and in tropical areas up to 13×14 cm), sparsely to densely stellate-pubescent on both surfaces, the stellate hairs from a scaly base, crenate-dentate, shallowly to clearly cordate at the base; petiole 1–3 cm long, stellate-tomentose. *Cymes* several- to many-flowered, crowded at the apices of the branches and branchlets; peduncles 1–4 cm long, stellate-tomentose, sometimes with few to many longer, tufted hairs intermixed, pedicels 0,5–1,5 cm long, pubescence as on the peduncles. *Bracts* 3, 1 or 2 at or near the calyx-base and 1 lower down, or all three scattered on the pedicel, linear to linear-spathulate or navicular, 1,5–5 mm long, sparsely to densely stellate-pubescent on both surfaces. *Calyx* rounded at the base, united for 0,5–1,5 mm; lobes 5–7 mm long, 1,5–2 mm broad near base, stellate-pubescent dorsally. *Petals* usually white (rarely rose-pink) turning a light cinnamon-brown, 7–10 mm long, 4,5–8 mm broad. *Stamens* united at the base for up to 0,5 mm; filaments up to 3 mm long; anthers 1 mm long or slightly longer; staminodes about 6 mm long. *Ovary* subglobose, about 2,5 mm in diameter, tomentellous with stellate hairs mixed in the upper half with tufted bristle-like hairs, bristles 0,5–1 mm long; style with a few short patent hairs or stellate-pubescent, 2,5–3,5 mm long; branches 1,5–2,5 mm long; cells usually 3 with 2 ovules in each cell. *Capsule* subglobose, about 5 mm in diameter, tomentellous with stellate and tufted hairs; the large bristle-like hairs up to 1 mm long.

Occurs plentifully in Natal, Swaziland, the Transvaal and South West Africa/Namibia; also found in Botswana and northwards to east tropical Africa. Two varieties are recognized, one widespread (var. *rotundifolia)* and the other from a restricted area in South West Africa/Namibia.

For key to varieties, see key to species.

(a) var. **rotundifolia.**

Verdoorn in Bothalia 9: 144 (1966).

Dombeya rotundifolia (Hochst.) Planch. in Fl. des Serres, sér. 1,6: 225 (1850–51); Harv. in FC 1: 221 (1860); K. Schum. in Engl., Monogr. Afr. Pfl. 5: 35 (1900); Medley Wood, Natal Pl. 3, t. 229 (1902); Sim, For. Fl. Cape Col. 145 (1907); Burtt Davy, Fl. Transv. 1: 259 (1926); Wild in FZ 1: 525 (1960); M. Friedrich-Holzhammer *et al.* in FSWA 84: 2 (1969). *Xeropetalum rotundifolium* Hochst. in Flora 27: 295 (1844). Type: Natal, Pietermaritzburg, *Krauss 252* (BM, iso.!).

D. densiflora Planch. ex Harv. in FC 2: 589 (1862). Type: Transvaal, Magaliesberg, *Burke & Zeyher s.n.* (K).

D. damarana K. Schum. in Engl., Monogr. Afr. Pfl. 5:36 (1900). Syntypes: Hereroland, *Marloth 1346*; *1371* (PRE). *Lindley s.n.*; *Gürich 40.*

D. dinteri Schinz in Bull. Herb. Boiss., sér. 2, 2: 1005 (1902). Syntypes: Hereroland, Waterberg, *Dinter 392* (Z); Ondjomberanga-Kette *Dinter 392a* (Z).

Characterized by very rough bark on stems; rather coarse suborbicular leaves which are densely or sparsely stellate-pubescent on both surfaces and have prominent reticulate veins beneath; the ovary is densely stellate-tomentose and setose, that is with tufts of bristle-like hairs which are up to 1 mm long, in upper portion.

This typical variety occurs in two growth forms. The commoner form is a tree 5 to 10 m tall with dark, rough bark, and bears its flowers profusely in spring on almost leafless branches. The other form, growing under less favourable conditions, is shrubby forming a low bushy growth and only occasionally developing into a tree. This ecotype flowers at any time from spring to autumn and, if late, then on leafy branches.

Found in fairly dry to dry areas; the spring-flowering tree form occurs in Natal, Swaziland and the Transvaal (also north-eastwards to the Ethiopian border); the shrubby late-flowering form is found on the central plateau of South West Africa/Namibia and also in parts of Botswana.

NATAL.—Durban: 'Port Natal', *Gueinzius s.n.* Camperdown: Inchanga, *Marloth 4084.* Hlabisa: Hluhluwe Game Reserve, *Ward 1408.* Inanda: Umhlanga, *Medley Wood 7942* (NH). Ubombo: Mkuze Game Reserve, *Oatley M6* (NH).

SWAZILAND.—Hlatikulu: Ebataan River, *Compton 27955*. Mbabane: Komati Bridge, *Compton 26980*. Stegi: *Verdoorn 1667a*.

TRANSVAAL.—Barberton: *Galpin 407*. Lydenburg: Sekukuniland, *Barnard 35*. Nelspruit: Pabinspruit, *Van der Schijff 47*. Piet Retief: Mooihoek, *Devenish 26*. Pilgrims Rest: near Skukuza, *Codd 4391*. Potchefstroom: Boskop, *Louw 357*. Pretoria: The Willows, *Codd 7582*; Meintjies Kop, *Burtt Davy 2188*; Fountains, *Verdoorn 465*. Rustenburg: Swartruggens, *Sutton 783*. Soutpansberg: Louis Trichardt, *Koker 16*. Waterberg: Mosdene, *Galpin M.33*.

S.W.A./NAMIBIA.—Grootfontein: *Kinges 2966*. Maltahöhe: Tsarris, *Marloth 5072*. Okahandja: Kaiser Wilhelms Berg, *Marloth 1346*. Okavango: Runtu, *Banks 91*, Otjiwarongo: Tue Koppie, *Bradfield 13*. Swakopmund: *Boss sub TRV 36121*. Windhoek: *De Winter 2595*.

The commoner form of this typical variety, in the adult stage, is conspicuous during early spring because of its profuse white (rarely pink) flowers borne on almost leafless, rough-barked trees. The same variety on the central plateau of South West Africa/Namibia and in places in Botswana, is hardly recognizable because it occurs as a bushy shrub, only here and there reaching tree form, and flowers at any time from spring to autumn, the flowers and leaves appearing together.

FIG. 1.—*Dombeya autumnalis* Verdoorn. Flowering branch taken from the type specimen when collected at Penge in April 1965: 1, bud with reflexed calyx, × 4; 2, petal, × 4; 3, portion of the united stamens showing one staminode and 3 stamens, × 4; 4, ovary and style, × 4; 5, leaf, × 1.

Botanical collectors look upon the latter form as an ecotype, the differences probably being caused by the struggle for existence under adverse conditions. Specimens from all parts agree in the suborbicular leaves and the bristly hairs on the ovary.

(b) var. **velutina** *Verdoorn* in Bothalia 9: 144 (1966); M. Friedrich *et al.* in FSWA 84: 3 (1969). Type: Rehoboth, Naukluft, Aub Schlucht, *Strey 2010* (PRE, holo.; BOL; NBG).

Tall shrubs with several virgate stems up to 5 m tall; bark rough; new growth softly and shortly tomentose. *Leaves* suborbicular or broadly oblong-orbicular, broadest in the upper half, 3–9 cm long, 2,5–9,5 cm broad, velvety-tomentose on both surfaces (the tomentum made up of minute stellate-pubescent scales, the hairs short and silky), crenate-dentate, cordate at the base, palmately 4–7-nerved; petiole 1–2 cm long, softly tomentose. *Cymes* crowded on lateral and terminal branchlets; peduncles 10–15 mm long; pedicels 7–10 mm long. *Calyx* about 6 mm long, densely and shortly tomentose without. *Petals* about 7 mm long. *Stamens* united at the base for about 0,5 mm; filaments unequal, about 2,5 mm long; staminodes about 5 mm long. *Ovary* densely and shortly stellate-tomentose (not setose); style 2–3 mm long, stellate-pubescent.

To date recorded only from the banks of the permanent stream at Aub Schlucht in the Naukluft Mountains, South West Africa/Namibia.

S.W.A./NAMIBIA.—Rehoboth: Aub Schlucht, Naukluft Mountains, *Strey 2328*; *Tölken & Hardy 666*; Hopefield, *Giess 10961*.

This variety agrees with the typical one in the suborbicular leaves and the rough bark on mature stems. This latter feature can be determined (as pointed out in notes under *D. autumnalis*) by the examination of a cross-section of a branchlet; the outer layer is seen to be rather thick and porous. It differs from the typical variety principally in the habit and the pubescence. The plants are tall, virgate shrubs with several comparatively slender stems and do not develop into trees, whereas typical *D. rotundifolia,* as found in South West Africa/Namibia, occurs as a low bushy shrub which, under certain conditions, grows into the characteristic rough-barked tree. The pubescence, which is a stellate tomentum as in the typical variety, differs in that the hairs are much shorter and rather silky, forming a dense, velvety covering. This short tomentum is of particular significance on the ovary because in typical *D. rotundifolia,* throughout the length and breadth of its distribution, the ovary is setose as well as stellate-tomentellous.

8. **Dombeya autumnalis** *Verdoorn* in Bothalia 9: 143 (1966). Type: Lydenburg, Penge Mine, *Verdoorn 2470* (PRE, holo.).

Shrub or small tree, 1,6–5 m tall. *Branchlets* slender, leafy, new growth shortly stellate-pubescent, the pubescence formed of short spreading hairs from a scaly base. *Stipules* caducous, deltoid or linear-subulate from a deltoid base, densely pubescent. *Leaves* more or less orbicular, 1,5–5 cm long, 1–5 cm broad (on flowering branches), densely to sparsely stellate-pubescent on both surfaces, finely crenate-dentate on the margins, reticulate veins rather obscure beneath; petiole slender, 2–12 cm long, stellate-pubescent. *Cymes* in the axils of the upper leaves often overtopping them, sometimes shorter; peduncles slender, about 2,5 cm long, pubescent; pedicels very slender, 1–1,5 cm long, pubescent. *Bracts* 3, 1 or 2 at the calyx-base, or all scattered on the pedicel, linear-navicular, about 2,5 mm long, pubescent on both surfaces. *Calyx* rounded at the base, united for 0,5 mm; lobes reflexed, about 4 mm long, 2 mm broad, dorsally stellate-pubescent. *Petals* persistent, white turning cinnamon-rufous with age, about 7 mm long, 5 mm broad. *Stamens* united at the base for more or less 1 mm, filaments with the longest about 2,5 mm long; anthers up to 1 mm long; staminodes about 5 mm long. *Ovary* globose, about 3 mm in diameter, shortly stellate-tomentose (not setose); style glabrous or minutely stellate-pubescent, about 2 mm long, branches about 2 mm long; ovules 2 in a cell. *Capsule* about 5 mm in diameter, stellate-tomentose. Fig. 1.

Recorded from the eastern Transvaal in mountainous country on mesophytic, well wooded slopes among rocks and in riverine bush.

TRANSVAAL.—Lydenburg: Abel Erasmus Pass, *Schlieben & Strey 8387*; *Codd 10027*; near Penge mine, *Codd & Dyer 7737*; *Codd & Verdoorn 10488*; *Repton 5936* (partly); *Verdoorn 2470*; near Weltevreden Asbestos Mine, *Verdoorn 2471*. Letaba: Dublin Mine, *Miller 4271*.

D. autumnalis differs from the form of typical *D. rotundifolia,* which occurs in the eastern and central areas of southern Africa, in that it flowers in late summer and autumn together with its leaves, and not in early spring only, on more or less leafless branches. From all forms of *D. rotundifolia,* including those in South West Africa/Namibia, *D. autumnalis* differs mainly in that its slender stems do not develop a rough bark. This feature can be determined by the examination of a cross-section of a branchlet. The outer layer of *D. autumnalis* is thin and solid, whereas that of *D. rotundifolia* is thick and porous. A further diagnostic character is that the pubescence on the ovary of *D. rotundifolia* is setose as well as stellate-tomentellous, whereas in *D. autumnalis* it is stellate-tomentose without setae (see Fig. 1). In the slender peduncles and pedicels, the comparatively thin leaves, and the habit, our species resembles *D. cymosa,* from which it can be readily distinguished by the leaf shape. In *D. cymosa* the leaves are acuminate in the upper third, not suborbicular, and more or less rounded at the apex.

UITTREKSEL

Die spesies van Dombeya *Cav. wat in suidelike Afrika voorkom, is hersien en 'n sleutel van die agt spesies in dié gebied word verskaf.* D. quinqueseta *(Del.) Exell, wat vir die eerste keer vir suidelike Afrika aangeteken word, is ingesluit.*

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The *Eriosema squarrosum* complex (Papilionoideae, Fabaceae) in southern Africa

C. H. STIRTON*

Keywords: *Eriosema squarrosum* complex, Fabaceae, new combinations, new taxa

ABSTRACT

Eriosema squarrosum (Thunb.) Walp. has traditionally been the dumping ground for all densely pubescent *Eriosema* species in southern Africa. This study clarifies the identity of *E. squarrosum*; recognizes three new taxa: *E.* **luteopetalum** C. H. Stirton, *E.* **rossii** C. H. Stirton and *E.* **umtamvunense** C. H. Stirton; effects the combinations *E.* **latifolium** (Benth. ex Harv.) C. H. Stirton and *E.* **acuminatum** (Eckl. & Zeyh.) C. H. Stirton; and reinstates *E. dregei* E. Mey. The species *E. preptum* C. H. Stirton, described earlier, also belongs to this complex. *Rhynchosia* **barbertonensis** C. H. Stirton is given as a new name for *E. rogersii* Schinz.

INTRODUCTION

The *Eriosema squarrosum* (Thunb.) Walp. complex remains the only unresolved complex among the *Eriosema* species of southern Africa. As in the *E. cordatum* E. Mey. complex (Stirton 1978, 1981a) it is partly a nomenclatural muddle and partly a taxonomic problem. Once again hybridization has played a prominent role in the development of the complex (Stirton 1981b).

The complex comprises the majority of the densely pubescent *Eriosema* species in southern Africa. Most of these plants have in the past been referred to either *E. zeyheri* E. Mey. or *E. squarrosum.*

Central to the complex is *E. squarrosum.* It was originally described by Thunberg as *Hedysarum squarrosum* (*Prodr.* 132, 1800), and later transferred to *Desmodium* by De Candolle (*Prodr.* 2: 333, 1825). Ecklon & Zeyher (*Enum.*: 251, 1836) accepted *Desmodium squarrosum* (Thunb.) DC. but divided it into 3 varieties: *squarrosum, acutifolium* and *acuminatum.* Ernst Meyer, whose *Commentariorum* is predated by Ecklon & Zeyher's *Enumeratio* by a few months, published the binomial *Eriosema zeyheri* E. Mey. for the same taxon (*Comm.* 129, 1836). At the same time he described *E. dregei* E. Mey., a species completely new to science. Here the matter rested until Walpers (*Linnaea* 13: 536, 1839) realized that Thunberg's *Hedysarum squarrosum* was not a *Desmodium,* as De Candolle and Ecklon & Zeyher had thought, but was as Meyer had noted, really an *Eriosema.* He accordingly effected the new combination, *E. squarrosum* (Thunb.) Walp.

Twenty three years later Harvey (*Fl. Cap.* 2: 260, 1862) re-investigated the genus. He accepted Walper's combination, effected the combination for var. *acuminatum* (Eckl. & Zeyh.) Harv., reduced *E. dregei* to varietal rank and described the new variety *latifolium* Benth. ex Harv. Thirty three years were to pass until Baker (*J. Bot., Lond.* 33: 146, 1895) applied the now disallowed Kew Rule and thereby caused considerable confusion with the attendant combinations. Problems have also arisen from the additional collections that have accumulated since Harvey's and Baker's treatments. Several new taxa have been discovered this century and with the known cases of hybridization in Natal the complex had become quite a muddle by the time this study was initiated in 1974.

This study recognizes eight species in the complex. Firstly *E. squarrosum* (Thunb.) Walp. is retained as a variable species. *E. dregei* E. Mey. is reinstated, whereas Meyer's *E. zeyheri* is placed in synonomy with *E. squarrosum.* Harvey's *E. squarrosum* var. *latifolium* Benth. ex Harv. is raised to specific rank; *E. latifolium* (Benth. ex Harv.) C. H. Stirton. Three new species are described: *E. luteopetalum* C. H. Stirton, *E. umtamvunense* C. H. Stirton and *E. rossii* C. H. Stirton. *E. preptum* C. H. Stirton was described earlier (Stirton 1981c). Ecklon & Zeyher's var. *acuminatum* is raised to specific rank: *E. acuminatum* (Eckl. & Zeyh.) C. H. Stirton.

KEY TO SPECIES

1a Flowers yellow or greenish yellow (drying yellow):

2a Stems and leaves silvery; upper surface of leaflets sparsely appressed pubescent; flower bracts caducous..... 5. *E. dregei*

2b Stems and leaves tawny, especially veins of leaves; upper surface of leaflets densely appressed pubescent; flower bracts persistent:

3a Flowers 9–10 mm long, yellow; wing petals much longer than the keel; flower bract shorter than the flower; pistil 7 mm long..... 7. *E. latifolium*

* The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AE, U.K.

3b Flowers 12–15 mm long, greenish yellow; wing petals equal in length to the keel; flower bract equal in length to flower; pistil 12 mm long ..... 3. *E. luteopetalum*

1b Flowers pinkish orange, pale red, or orange with red venation (drying dark):

4a Flower bracts persistent, equal to or longer than the flower:

5a Lower surface of leaflets pale green, finely pubescent with margins and veins appressed hairy; inflorescence hidden in leaves at anthesis, 30–60-flowered; flowers 12 mm long; fruits 10 mm wide ..... 6. *E. rossii*

5b Lower surface of leaflets whitish, densely woolly with yellow appressed hairs along the veins; inflorescence exserted from leaves at anthesis, 20–30-flowered; flowers 8–10 mm long; fruits 7–8 mm wide ..... 2. *E. acuminatum*

4b Flower bracts caducous, shorter than the flower:

6a Flowers 13–14 mm long; calyx 8 mm long; appendages of standard fused but free from auricles; pistil 11 mm long ..... 4. *E. umtamvunense*

6b Flowers 6–9 mm long; calyx 4–6 mm long; appendages of the standard fused and extending to the auricles; pistil 6–8 mm long:

7a Undersurface of leaflets finely and shortly pubescent; leaflets 15–20 mm wide; racemes 10–20-flowered; flowers 6–7 mm long; seeds black or dark brown; eastern Cape ..... 1. *E. squarrosum*

7b Undersurface of leaflets densely woolly with veins distinctly appressed with longer hairs; leaflets 20–30 mm wide; racemes 25–35-flowered; flowers 7–9 mm long; seeds grey or light brown with darker speckles and blotches; Natal ..... 8. *E. preptum*

QUICK-SORT CHARACTERS

Flowers yellow: *luteopetalum, latifolium, dregei*

Inflorescence with less than 20 flowers: *squarrosum*

Flower bracts caducous: *dregei, squarrosum, umtamvunense, preptum*

Flower bracts equal to or longer than flowers: *acuminatum, rossii*

Calyx teeth shorter than the calyx tube: *dregei, latifolium, luteopetalum*

Appendages on front of standard free from the auricles: *acuminatum, umtamvunense*

Wing petals equal in length to the keel petals: *luteopetalum*

Seeds black: *acuminatum, squarrosum*

Seeds pale chestnut brown: *luteopetalum*

Seeds grey or brown with speckles and blotches: *preptum*

1. **Eriosema squarrosum** *(Thunb.) Walp.* in Linnaea 13: 536 (1839); Harv. in Fl. Cap. 2: 260 (1862). Type: Cape, 'crescit in campis graminosis cis et trans Camtoos-river, prope Galgebosch et alibi', *Thunberg s.n.* (UPS, Herb. 17271, microfiche).

Hedysarum squarrosum Thunb., Prodr. 132 (1800); Fl. Cap. 595 (1823). *Desmodium squarrosum* (Thunb.) DC., Prodr. 2: 233 (1825); Eckl. & Zeyh., Enum. 251 (1836).

Crotalaria lineata Thunb., Prodr. 125 (1800); Fl. Cap. 573 (1823); non Jacq. (1786). Type: 'e Cap. Bon. Spei', *Thunberg s.n.* (UPS, Herb. 16559, microfiche).

Desmodium squarrosum (Thunb.) DC. var. *acutifolium* Eckl. & Zeyh., Enum. 251 (1836). Type: Cape, 'in collibus gramineis terrae, Adow', *Ecklon s.n.* (S, holo.; FI; K; P; W, iso.).

Eriosema zeyheri E. Mey., Comm. 129 (1836); Bak. in J. Bot., Lond. 33: 146 (1895). *Rhynchosia zeyheri* (E. Mey.) Steud., Nom. 2: 54 (1841). Lectotype: Cape, 'Zwartkopsrivier, ad ipsus ripas, iv.C.c.20', *Drège s.n.* (BM; K; P, isolecto.)

Eriosema reticulatum E. Mey. var. *canescens* Meisn. in J. Bot., Lond. 2: 80 (1843). Lectotype: 'in solo argillaceo in Zitsikamma', *Krauss 926* (NY). This is marked in some herbaria as *E. ambiguum* Krauss (nom. nud.)

Perennial herb up to 300 mm tall. *Stems* ascending, strongly branched from the base, closely clothed with deflexed hairs. *Leaves* trifoliolate, 25–55 × 15–20 mm, elliptic, becoming narrower and longer, grading into lanceolate near the ends of branches, lower leaves often obovate; apex acute, sometimes obtuse, base cuneate, dark green above, whitish beneath, upper surface glabrous to strigillose, lower surface finely and shortly pubescent, glandular; lateral leaflets smaller, asymmetrical. *Stipules* 7–10 mm long, narrowly lanceolate, free, appressed, persistent, softly pubescent and sparsely covered in glands. *Petioles* 2–3 mm long. *Racemes* axillary, up to 100 mm long, exceeding the leaves; peduncles 26–55 mm long, densely racemose beyond the middle with 10–20 reflexed imbricating flowers. *Flowers* 7–9 mm

FIG. 1. — Representative specimen of *Eriosema squarrosum (PRE 56220).*

long, pinkish orange; bracts caducous, about half the length of the flower. *Calyx* 5–6 mm long, lobes equal; teeth lanceolate, equal to or slightly longer than the tube, softly white pubescent, glandular. *Standard* 8–9 mm long, narrowly obovate, clawed, auriculate; gland-covered and pubescent on back; appendages present, well developed, situated above the auricles and tapering towards them, fused. *Wing petals* 9 × 2 mm, oblong, auriculate, longer than the keel. *Keel petals* 7 mm long, 3 mm wide at maximum, encrusted with yellow glands, distinctly pocketed. *Staminal sheath* 10 mm long; free stamen geniculate. *Pistil* 8 mm long; ovary 4 mm long, subsessile, densely hairy almost up to point of flexure; height of curvature 3 mm; stigma capitate. *Nectary* present, margin undulate. *Fruit* 11–15 × 8–10 mm, glandular, covered in fine hairs overlain by long stiff yellow hairs. *Seeds* 5 × 3 mm, black or dark brown. Fig. 1.

This species is almost entirely confined to the eastern Cape (Fig. 2) where it is confined to grassveld and sandy flats. It is sympatric with *E. salignum* E. Mey. and in the eastern part of its range with *E. cordatum* E. Mey., *E. dregei* E. Mey. and *E. latifolium* (Harv.) C. H. Stirton. It has been extremely difficult to assign rank to any of the several distinctive localised variants as these overlap and blur into each other. There is however a cline of increasing pubescence, especially on the upper surface of the leaflets as well as a general increase in size as one moves northwards and eastwards.

TRANSKEI.—3129 (Port St Johns): Coffee Bay (–CC), *Tyson 22* (PRE). 3227 (Stutterheim): Kabaku Hills (–CB), *Acocks 9344* (PRE); near Komgha (–DB), *Flanagan 704* (PRE). 3228 (Butterworth): Idutywa (–AB), *Schlechter 1377, 6271* (PRE); River Mouth (–BC), *Hilner 485* (PRE); Kentani (–CB), *Pegler 123* (PRE).

CAPE.—3225 (Somerset East): Selborne (–DA), *Smith 3711* (PRE); Boschberg (–DC), *Macowan 475* (P); Stockenstrom (–DD), *Scully 155* (PRE). 3226 (Fort Beaufort): Katberg (–BC), *Moss 15400* (BM). 3227 (Stutterheim): Cathcart (–AC), *Kemp s.n.* (NGB); Hang River (–BA), *Spearman 25* (NBG); west of East London (–BB), *Maguire 605* (NBG); Dohne (–CB), *Acocks 9381* (K; PRE); Pierie (–CC), *Sim 4021* (PRE); King William's Town (–CD), *Tyson 2942* (NBG; PRE); 1 km from Amabele (–DA), *Marais 237* (PRE); Port Alfred (–DB), *South s.n.* (PRE 56218, 56219). 3228 (Butterworth): 12 km E of East London (–CC), *Comins 1256* (PRE). 3322 (Oudtshoorn): George (–CD), *Guthrie 4293* (NBG). 3323 (Willowmore): Wynandskraal (–CD), *Burchell* 5263 (K). 3324 (Steytlerville): Zwartkopsrivier (–DB), *Drège s.n.* (BM; GBH; K; P; W); Tsitsikamma (–DC), *Krauss 926* (NY). 3325 (Port Elizabeth): Zuurbergen (–AD), *Drège s.n.* (P); Van Stadens Flower Reserve (–CC), *Dahlstrand 2533* (PRE; STE); Van Stadens Gorge (–CC), *Long 267* (PRE); Van Stadensberg (–CC), *MacOwan 475* (BM); Krakakamma (–CD), *Burchell 4573* (K); Uitenhage (–CC), *Penther 2559* (W); Addo (–DA), *Drège s.n.* (GBH; K; P; Z); Addo (–DA), *Zeyher s.n.* (K); *Ecklon s.n.* (K; P; W); flats near Port Elizabeth (–DC), *West 461* (PRE). 3326 (Grahamstown): Rautenbach's Drift (–AC), *Burchell 4191* (K); mountains near Grahamstown (–AD), *Britten s.n.* (PRE 56210); *Gane s.n.* (PRE); near Alexandria Lombards (–DA), *Burchell 4155* (K); near Port Alfred, between Rietfontein and Kowie River (–DB), *Burchell 4002* (GBH; K); Port Alfred (–DB), *Sonta s.n.* (PRE 56218); Kowie (–DB), *Tyson s.n.* (PRE); 5 km from Port Alfred on road to Kenton-on-Sea (–DB), *Germishuizen 1531* (PRE); between Bathurst and Port Alfred (–DB), *Stirton 764a;* Rietfontein (–DB), *Burchell 4042* (K); 3 km NNW of Southwell (–DA), *Acocks 12053* (PRE). 3423 (Knysna): Knysna (–AA), *Herb. STE 13509* (STE); *Breyer s.n.* (PRE 23904); Plettenberg Bay (–AB), *Zeyher s.n.* (NBG). 3424 (Humansdorp): Slang River (–BA), *Spearman 25* (PRE); *Fourcade 1860* (BOL); Humansdorp (–BB), *Fourcade 1727* (BOL). Without precise locality: *Bouvin s.n.* (P); *Bowie s.n.* (BM; K); *Bunbury s.n.* (BM); *Cooper s.n.* (NY); *Duthie 516* (STE); *Drège s.n.* (NY); *Ecklon s.n.* (TCD, W); *Fourcade 1939* (BOL); *Germishuizen* 1745 (PRE); *Macowan 475* (P); *Masson s.n.* (BM); *Verreaux s.n.* (G; TCD).

This species has been and is easily confused with *E. acuminatum* (below) and *E. preptum* (no. 8). For differences see under the latter species.

Eriosema squarrosum is the smallest of all the Cape, Transkeian and Natal species. It flowers from September through to March.

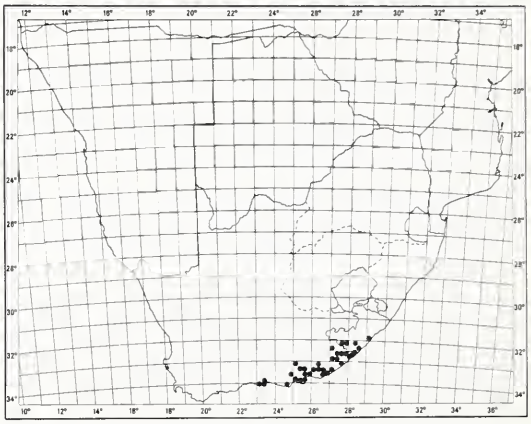

FIG. 2. — Known distribution of *Eriosema squarrosum.*

2. **Eriosema acuminatum** *(Eckl. & Zeyh.) C. H. Stirton,* comb. et stat. nov. Type: 'In collibus montis Wintersberg prope Phillipstown', *Ecklon s.n.* (S, holo.!; FI; K; P, iso.!).

Desmodium squarrosum (Thunb.) DC. var. *acuminatum* Eckl. & Zeyh., Enum. 251 (1836). *Eriosema squarrosum* (Thunb.) Walp. var. *acuminatum* (Eckl. & Zeyh.) Harv., Fl. Cap. 2: 260 (1862). *E. zeyheri* E. Mey. var. *acuminatum* (Eckl. & Zeyh.) Bak., J. Bot., Lond. 33: 147 (1895).

Perennial herb up to 250 mm tall. *Stems* ascending to erect, branching near the base, densely clothed in golden-brown hairs. *Leaves* trifoliolate, 40–50 × 25–30 (–35) mm, broadly elliptic but becoming narrower and longer towards the ends of branches, lower leaves often obovate; apex acute, base cuneate, appressed pilose above, densely woolly below with yellow appressed hairs massed along the veins, glandular; lateral leaflets smaller, gibbous. *Stipules* 11–16 (–20) mm long, falcate-lanceolate, free, clasping the stem, sparingly appressed pubescent with long hairs interspersed from the centre thickening towards the apex. *Petioles* shorter than 5 mm. *Racemes* axillary, (40–) 60–90 (–140) mm long, exceeding the leaves; peduncles 40–55 mm long, densely racemose beyond the middle and bearing 20–30 flowers. *Flowers* 8–10 mm long, pale red or orange, rarely yellowish; bracts persistent, equal to or exceeding the flower. *Calyx* 6 mm long, lobes equal; teeth narrowly lanceolate, equal to the tube, keel tooth almost acicular, slightly longer than the vexillar and lateral teeth; covered in 3 mm long yellowish brown hairs and a few scattered glands. *Standard* 10 × 5–7 mm, narrowly to broadly obovate, subtended

by a 3 mm long claw, auriculate; appendages present, situated 4 mm from the base of the claw but above the auricles and free of them. *Wing petals* 9–10 mm long, 2, 5–3, 0 mm wide, cultrate, strongly auriculate, upcurving, longer than the keel. *Keel petals* 8 mm long, up to 3,5–4,0 mm wide, covered in yellow glands, distinctly pocketed. *Staminal sheath* 7–9 mm long, free stamen geniculate. *Pistil* 8 mm long; ovary 3 mm long, subsessile, densely hairy at least until halfway to the point of flexure of the style; height of curvature 2,5 mm; stigma capitate. *Nectary* present, margin erose. *Fruit* 11–12 × 7–8 mm, glandular, covered in reddish shaggy hairs. *Seeds* 5 × 3 mm, black, oblong. Fig. 3.

Eriosema acuminatum occurs mainly in grasslands in the Transkei (Fig. 4). It has not often been collected and is probably more common within its known overall distribution area than its representation in herbaria suggests. According to herbarium labels this species flowers between October and Novembér, but also occasionally in December and January. No ecological data were found on herbarium labels.

NATAL.—2929 (Underberg): Injassuti Heights (–AB), *Thode 8225* (STE). 3030 (Port Shepstone): Umtamvuna Nature Reserve (–AA), *Abbott 2195* (NH); Shelley Bay (–CD), *Mogg 11920* (PRE). 3130 (Port Edward): Port Edward (–AA), *Stirton 5643, 5672* (PRE); S of Port Edward (–AA), *Germishuizen 1745* (PRE); *Ngwenya 215* (NH).

FIG. 3. — Holotype of *Eriosema acuminatum (Ecklon s.n.)*

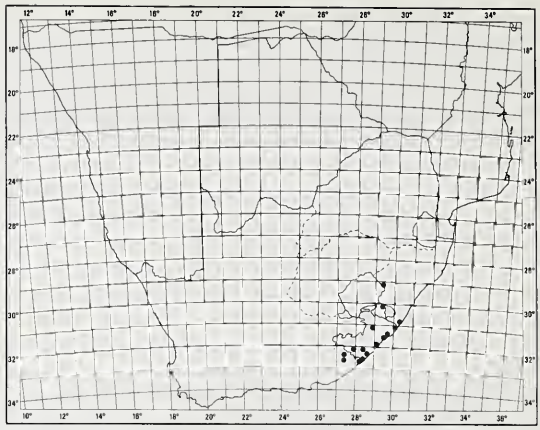

FIG. 4. — Known distribution of *Eriosema acuminatum.*

TRANSKEI.—3029 (Kokstad): Cabane River (–AB), *Tyson 2653* (NBG). 3128 (Umtata); Umtata (–DB), *Sole s.n.* (NBG); Umtata District (–DB), *Penther 2610* (W). 3129 (Port St Johns): Ntsubane Forest Station (–BC), *Galpin 10994* (PRE); 73,2 km from Umtata to Port St Johns (–CB), *Grobbelaar 2311* (PRU); Coffee Bay (–CC), *Tyson 22* (PRE; NY); Port St Johns area (–DA), *Swinney & Baker 14146* (PRE). 3228 (Butterworth): Idutywa (–AB), *Schlechter 1377, 6271* (NBG; P; STE); 1 km from Butterworth to Komgha (–AC), *Grobbelaar 2306* (PRU); Komgha (–CB), *Compton 17657* (NBG); Kabonqaba (–CB), *Taylor 3706* (NBG). 3226 (Fort Beaufort): Klipplaats River (–BB), iv.a.2., *Drège* s.n. (K; G; P; W). 3227 (Stutterheim): Fort Cunynghame (–AD), *Taylor 4239* (NBG); Donga Range (–CB), *Acocks 9344* (PRE). 3327 (Peddie): Igoda Holiday Camp (–BB), *Steyl 4* (STE). 3228 (Butterworth): Qora Mouth (–BC), *Hilner 485* (PRE); Kentani (–CB), *Pegler 123* (PRE). Without precise locality: *Barber s.n.* (TCD).

E. acuminatum can be separated from *E. squarrosum* (above) by its much longer, persistent flower bracts that are equal to or longer than the flowers, by the appendages on the standard being above and well free of the auricles and by the presence of golden or russet pubescence especially on the calyx and the undersurface of the leaflets. In *E. squarrosum* the flower bracts are caducous, shorter than the flower, the pubescence is white and the appendages are better developed extending into the auricles of the standard. From *E. rossii* C. H. Stirton it differs in its much narrower stipules, larger fruits and pubescence of the leaflets.

3. **Eriosema luteopetalum** *C. H. Stirton,* sp. nov., *E. latifolio* (Harv.) C. H. Stirton affinis, sed floribus maioribus, bracteis longioribus differt.

Suffrutex usque ad 600 mm altus, vere florens. *Folia* trifoliolata, 45–60 × 35–45 mm, lateralia minora, asymmetrica, obovata vel anguste obovata. *Stipulae* 12–15 mm longae, liberae. *Racemi* axillares, 24–45-flori, folia subtendentia superantes. *Flores* 12–15 mm longi, lutei, bracteae 10–15 mm longae, persistentes. *Calyx* lobis aequalibus. *Vexillum* 10–15 × 6–7 mm, obovatum, unguiculatum, reflexum, callis bene evolutis connatis, sursum crispis, supra unguem in auriculas extensis. *Alae* carinam subaequilongae. *Vagina staminalis* 10 mm longa. *Gynoecium* 10 mm longum; ovarium 5 mm longum, dense pubescens. *Fructus* 14–16 × 8–9 mm, sericeus, tenuiter pubes-

FIG. 5. — Holotype of *Eriosema luteopetalum (Stirton 5652).*

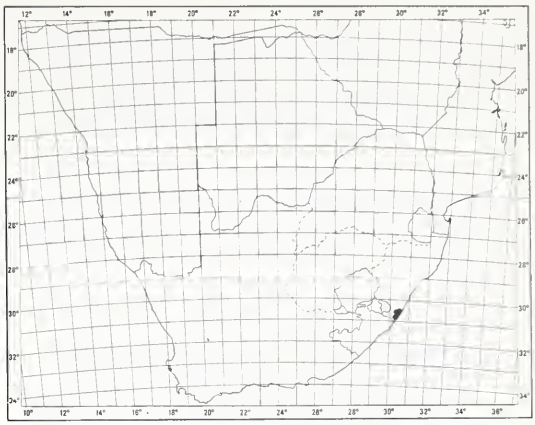

FIG. 6. — Known distribution of *Eriosema luteopetalum.*

cens. *Semina* 6 mm longa, 4 mm lata, pallide castanea.

TYPE.—Natal, 3030 (Port Edward): Roselands (–CD), *Stirton 5652* (PRE, holo.; K, iso.).

Suffrutex up to 600 mm tall. *Stems* erect, branching from the base, densely covered with golden deflexed appressed hairs. *Leaves* trifoliolate, 45–60 × 35–45 mm, obovate, inland populations with leaflets becoming narrower, more acute and ovate; strigose above, densely white pubescent below with veins prominently yellowish strigose; lateral leaflets smaller. *Stipules* 12–15 mm long, broadly lanceolate, free, persistent. *Racemes* axillary, 24–45-flowered, greatly exceeding the leaves. *Flowers* greenish yellow, 12–15 mm long with persistent 10–15 mm long, 3 mm wide boat-shaped bracts. *Calyx* lobes equal. *Standard* 10–15 × 6–7 mm, obovate, prominently clawed and auriculate, appendages well developed, fused, upcurled, extending from above the claw into the auricles. *Wing petals* equal in length to the keel, pouched. *Keel petals* pocketed, encrusted with small yellow glands. *Staminal sheath* 10 mm long; free stamen geniculate. *Pistil* 10 mm long; ovary 5 mm long, subsessile, densely hairy, extending halfway along style to point of flexure, height of curvature 4 mm; stigma capitate, exserted beyond stamens. *Nectary* present, margin undulate. *Fruit* 14–16 × 8–9mm, thickly covered with a mixture of long yellowish hairs and short white pubescence, glandular; upper margin double convex, lower margin convex-concave, beaked. *Seeds* 6 mm long, 4 mm wide, oval, pale chestnut brown; cotyledons well developed, radicle short, barely protruding from apex, plumule exserted. Fig. 5.

This species is endemic to southern Natal (Fig. 6) but may yet be discovered in the Transkei. It is common along the coast and seems to grow best on sandy soils in previously burnt grassland. (Fig. 7). The range of this species appears to be extending as a result of roadbuilding activities.

FIG. 7. — Habit and habitat of *Eriosema luteopetalum.*

NATAL.—3030 (Port Shepstone): The Valley, Port Shepstone (–CB), *Martin s.n.* (PRE); Margate (–CD), *Stirton 5660* (K; PRE), *10355* (NU); Shelley Beach (–CD), *Surton 5664* (K; PRE); Roselands (–CD), *Stirton 5652* (K; PRE); Uvongo (–CD), *Grobbelaar 1009* (PRE); near Izotsha turn-off on Ramsgate-Port Shepstone Road (–CD), *Stirton 1407* (PRE). Without precise locality: *Drège s.n.* (L; P; W); *Wood 3139* (K).

Eriosema luteopetalum is a very showy shrub worthy of consideration as a garden plant. It produces masses of inflorescences in spring providing a flash of yellow colour, soon to be followed by colourful brown fruits that persist on the plant long after the fruits have explosively scattered their seeds.

The specific epithet *luteopetalum,* was chosen to draw attention to the massed yellow flowers. It seems remarkable that this distinctive and locally abundant species has, until recently, been so rarely collected. This species appears to have been missed by most of the early collectors. Its nearest allies are *E. latifolium* (no. 7) and *E. dregei* (no. 5) from which it differs in its very much larger flowers and distinctive pubescence.

4. **Eriosema umtamvunense** *C. H. Stirton,* sp. nov., *E. squarroso* (Thunb.) Walp. affinis, sed planta maiora, robustiora, floribus maioribus differt.

Herba perenna usque ad 50 mm alta, vere florens. *Folia* trifoliolata, 57–70 × 28–40 mm, lateralia minora asymmetrica, elliptica. *Stipulae* 13 mm longae, libri. *Racemi* axillares, 20–25-florati, folia subtendentia superantes. *Flores* 13–14 mm longi, rosei flavique; bracteae 8 mm longae, caducae. *Calyx* 6 mm longa, lobi tubam subaequantes. *Vexillum* 13 × 9 mm, unguiculatum, reflexum, calli bene evoluti, conferruminati cucullati, ab auriculis liberi. *Petala carinae* breviora quam alae. *Vagina staminalis* 10–12 mm longa. *Gynoecium* 11 mm longum; ovarium 5 mm longum, dense pubescens. *Fructus* 15–16 mm longus, 10–11 mm latus, molliter flavo-pubescens.

TYPE.—Transkei, 3130 (Port Edward): near Ku-Mankenbeya, Imizizi location (–AA), *Stirton 5624* (PRE, holo.). Fig. 8a.

Erect perennial shrub up to 500 mm high. *Rootstock* horizontal, branched. *Stems* up to 20, branching from lower nodes, densely recurved, appressed fulvous above but less dense towards the base. *Leaves* trifoliolate, 57–70 × 28–40 mm, length-breadth ratio 1,6–1,9, scalloped, symmetrical, elliptic; laterals smaller, 50–65 × (19–) 24–32 mm, gibbous, length-breadth ratio 1,3–1,9, asymmetrical; finely appressed hirsute above but dull green; tertiary venation visible in fresh leaves if held against the light; lower surface finely woolly grey to white with longer fulvous hairs on the primary veins, small yellow glands visible; both terminal and lateral leaflets have a hairy midrib above; lowest leaves of the plant are obovate, apiculate. *Stipules* 13 × 6 mm, widest at middle, free, rapidly senescent, semipatent, tip re-

FIG. 8. — *Eriosema umtamvunense (Stirton 5624)*: a, holotype; b, inflorescence; c, habit and habitat.

curving, glabrous inside, pubescent outside, hairier along the margin. *Petioles* 3 mm long. *Racemes* up to 125 mm long, floriferous section 55 mm long, elongating with anthesis, 20–25-flowered. *Flowers* 13–14 mm long; red and yellow (Fig. 8b); bracts 8 mm long, caducous. *Calyx* 8 mm long, lobes equal; teeth more or less equal to the tube. *Standard* 13 × 9 mm; claw 3 mm long; emarginate sides recurved; bright brick red on the back, venation black, base above the claw yellow; glands present, yellow; appendages present, hooded, free from auricles. *Wing petals* 13 × 4 mm, cultrate, longer than the keel; orange, suffused with pink. *Keel petals* 12 mm long, 5 mm wide at broadest point, sparsely covered in yellow glands. *Staminal sheath* 10–12 mm long, free stamen geniculate. *Pistil* 11 mm long; ovary 5 mm long; height of curvature 4 mm high; stigma small, exserted. *Nectary* present. *Fruits* 15–16 × 10–11 mm, with 3–4 mm long beak; staminal sheath shrivelled but persistent during fruiting, densely covered in long, golden, appressed hairs. *Seeds* unknown.

Eriosema umtamvunense is endemic to the rolling grasslands decking the plateaux on either side of the Umtamvuna Gorge (Fig. 8c). So far it has been recorded only above 300 m. It is restricted, with *E. latifolium,* to Acocks's Pondoland Coastal Plateau Sourveld (Fig. 9). Flowering takes place in November and December.

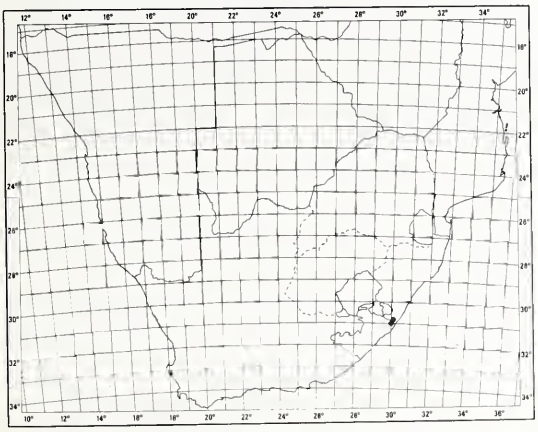

FIG. 9. — Known distribution of *Eriosema umtamvunense.*

TRANSKEI.—3130 (Port Edward): near Ku-Mankenbeya in the Umizizi area (–AA), *Stirton 5624* (K; PRE).

NATAL.—3030 (Port Shepstone): Blencathra Farm (–AA), *Stirton 8063* (PRE); Izingolweni Hill (–AA), *Hilliard 1709* (NU); 7 km from Port Edward to Izingolweni (–AA), *Stirton 8099* (PRE); 10 km from Izingolweni to Port Edward (–CC), *Stirton 1389* (K; PRE); Beacon Hill East (–CC), *Strey 7242* (NU); Skyline Farm (–CC), *Schrire 320* (NU; NH); Skyline Farm (–CC), *Germishuizen 1713* (PRE); 15 km from Izingolweni to Port Edward (–CC), *Stirton 1388, 1391* (PRE); Umtamvuna River (–CC), *Nicholson 1306* (PRE); Umtamvuna Nature Reserve (–CC), *Van Wyk 5149* (PRU).

E. umtamvunense is a very distinctive, locally abundant *Eriosema,* yet like *E. latifolium* it has been collected rather infrequently. *Strey 7242,* collected as recently as 1967, is the first record of the species. It seems to have been missed by all the early collectors. This is not surprising as it is distributed on top of the escarpment and generally grows in grassland that would have been largely inaccessible to early explorers. One wonders what other treasures are still to be discovered in the Umtamvuna Gorge and its escarpment.

This species has been consistently lumped with *E. squarrosum* (no. 1), *E. dregei* (below), *E. latifolium* (no. 7) and *E. luteopetalum* (no. 3). It differs from all of these species in its red and yellow flowers and golden-haired calyces; occasional yellow morphs can occur. The latter species all have yellow flowers and silver-haired calyces. From *E. preptum* (no. 8) it can be separated by its much larger flowers and fruits and by the wing petals exceeding the keel petals.

5. **Eriosema dregei** *E. Mey.,* Comm. 129 (1836). *Rhynchosia dregei* (E. Mey.) Steud., Nom. 2: 454 (1841). *Eriosema squarrosum* (Thunb.) Walp. var. *dregei* Benth. ex Harv., Fl. Cap. 1: 260 (1862). *E. zeyheri* E. Mey. var. *dregei* (E. Mey.) Bak. f. in J. Bot., Lond. 33: 147 (1895). Lectotype: Natal, Umzimkulu River, *Drège s.n. V.c. 18* (P; K, isolecto.).

Suffrutex up to 400 mm high. *Stems* 4–10, branched from the base, finely appressed white pubescent. *Leaves* trifoliolate; upper leaflet 60–70 × 30–33 mm, ovate to narrowly ovate; laterals somewhat gibbous, 45–50 × 21–25 mm; finely grey woolly beneath, finely sericeous, greyish green above; rhachis channelled. *Stipules* 12 × 4 mm, free, senescing before leaves expand. *Petioles* 3–4 mm long. *Racemes* axillary, up to 67-flowered, exceeding leaves, 55–60 mm long. *Flowers* 14 mm long, yellow; bracts 5 × 2 mm, boat-shaped. *Calyx* 7–8 mm long, lobes equal; teeth 3–4 mm long, shorter than the tube, finely covered in grey hairs and minute yellow glands. *Standard* 14 × 9 mm, obovate, emarginate; claw 3 mm long; auricles present 4 mm apart; back of standard finely pubescent and densely covered in minute yellow glands; appendages present, fused, hooded, extending to auricles. *Wing petals* 13 mm long, up to 3 mm wide, slightly longer than the keel blades, basal part held horizontally, but other edges drooping. *Keel petals* 12,5–13,0 mm long, up to 7 mm wide, densely covered in yellow glands. *Staminal sheath* 11 mm long, tenth stamen free. *Pistil* 11 mm long; ovary 4 mm long; height of curvature 4 mm, style thickened at point of flexure. *Nectary* present, margin erose. *Fruit* 15 × 11 mm, beak 2 mm wide; chestnut-brown covered in soft 2 mm long, red-brown hairs. *Seeds* unknown. Fig. 10.

Eriosema dregei is endemic to the low-lying coastal dune and riverine grasslands, below 200 m altitude, and extending from Port Edward in Natal to the Mkambati River Mouth in the Transkei (Fig. 11). The area between these localities and Port St Johns is little explored and this species can be expected to occur there. Flowering takes place between August and October.

NATAL.—3130 (Port Edward): Port Edward (–AA), *Stirton 5671* (PRE), *8068* (K; PRE; NU); *Germishuizen 1532, 1740* (PRE); *Ngwenya 214* (NH).

TRANSKEI.—3129 (Port St Johns): 4 km inland from Port Grosvenor (–BD), *Strey 8905* (K; PRE); Mkambati (–BD), *Van*

FIG. 10. — Representative specimen of *Eriosema dregei (Stirton 5671).*

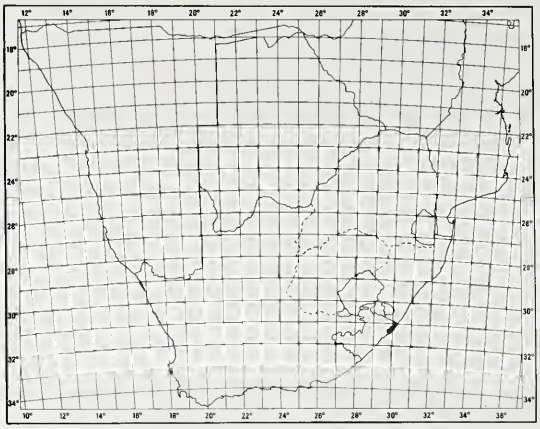

FIG. 11. — Known distribution of *Eriosema dregei.*

Wyk 1551 (PRE); Msikaba River Mouth, *Venter & Vorster 204* (PRE). 3130 (Port Edward): Mzamba River Mouth (–AA), *Stirton 5604* (K; PRE). Without precise locality: Umzimkulu River, *Drège V.c. 18* (K; P).

Eriosema dregei is most commonly confused with *E. luteopetalum* (no. 3) from which it differs in its silvery stems and immature leaves, narrower wing and keel petals, smaller caducous flower bracts, and the silvery appressed pubescence of the upper surface of the leaflets. In *E. luteopetalum* the stems and leaves are russet- or golden-brown, the flower bracts are nearly twice as long and wider, and the pubescence on the upper surface of the leaflets is short, appressed and yellowish.

Like *E. luteopetalum* this species is also rather attractive, especially when in full flower. These small silvery plants stand out quite strikingly in the coastal grasslands where they occur. *E. dregei* is sympatric with *E. acuminatum* (no. 2) but is allopatric with *E. luteopetalum* (no. 3) *E. umtamvunense* (no.4) and *E. latifolium* (no. 7).

Strey 8905, collected near Port St Johns, has a very characteristic facies and may turn out to be a new species. This distinctive plant should be searched for and compared with *E. dregei.*

6. **Eriosema rossii** *C. H. Stirton,* sp. nov., affinitate incerta.

Herba perennis ad 350 mm alta, vere florens. *Caules* erecti, basi ramificantes, subtiliter pubescentes pilis reflexis. *Folia* trifoliolata, 45–65 × 25–30 mm, elliptica; lateralia minora asymmetrica. *Stipulae* 15–18 mm longae, liberae. *Racemi* axillares, 30–60-florati ut pseudospicati congesti, foliis aequilongi. *Flores* 12 mm longi, aurantiaci venis rubribus flavique; bracteo ad 12 mm longo. *Calyx* 7 mm longo. *Vexillum* 11 mm longum, 6–7 mm latum, anguste obovatum, auriculatum, reflexum. *Petala carinae* breviora quam alae. *Vagina staminalis* 7 mm longa. *Gynoecium* 7–8 mm longum; ovarium sericeum. *Fructus* 15 mm longus, 10 mm latus, pilis patentibus, 2–3 mm longis vestitus.

TYPE.—3030 (Port Shepstone): 1 km from Hlutakungo on road to Highflats (–AD), *Stirton 1205* (PRE, holo.; K, iso.).

Erect herb up to 350 mm high, arising from a short vertical rootstock with constricted outline; lateral branches very constricted, horizontal. *Stems* up to 10, covered in semi-patent, downward pointing hairs and short appressed hairs. *Leaves* trifoliolate; terminal leaflet 45–65 × 25–30 mm, elliptic; laterals 38–55 × 16–20(–27) mm, gibbous, length-breadth ratio 1,4–2,0; densely covered in fine erect silky hairs; lower surface covered with numerous small yellow glands, margins and veins appressed hairy, finely pubescent between; upper surface dark green, lower pale green. *Stipules* 15–18 mm long, up to 6–8 mm wide, free, green, erect, clasping the stem. *Racemes* axillary, 30–60-flowered, hidden by the leaves during anthesis but elongating thereafter. *Flowers* 12 mm long, pale orange, equal in length to the subtending bracts. *Calyx* 7 mm long, lobes equal, tube 2 mm long, teeth triangular, covered in golden patent hairs. *Standard* 11 mm long, up to 6–7 mm wide, narrowly obovate, auriculate, clawed, apex truncate; back red with darker venation and packed with yellow glands, inside pale orange with red venation and yellow nectar guide. *Wing petals* 10 × 2,3 mm, claw 3 mm long; auriculate, triangular; exceeding the keel blades; pale pink with red venation and

with a few small yellow glands and hairs along the main vein. *Keel petals* lined with red along the lower margins, densely covered with yellow glands. *Staminal sheath* 7 mm long, tenth stamen free. *Pistil* 7–8 mm long; ovary silky; height of curvature 2 mm; stigma large, capitate. *Fruits* 15 × 10 mm, very shortly beaked, bracts still persistent during fruiting; constricted, clothed in 2–3 mm long reddish hairs. *Seeds* unknown. Fig. 12.

FIG. 12. — Isotype of *Eriosema rossii (Stirton 1205).*

Eriosema rossii is restricted to the higher-lying Ngongoni Veld (Acocks's Veldtype 5) of southern Natal and the eastern Transkei (Fig. 13). The Umkomaas River Valley bisects Acocks's Veldtype 5 and it may be significant that many legumes found in the southern portion of this veld type have not been recorded from the area north of the Umkomaas River. Another example in *Eriosema* is *E. populifolium* Harv.

NATAL.—3029 (Kokstad): Ingeli Forest area (–DA), *Stirton 8113* (PRE). 3030 (Port Shepstone): 10 km from Highflats to Umzinto (–AB), *Stirton 8202* (PRE); 1 km from Hlutakungo to Highflats (–AD), *Stirton 1205* (K; PRE); 4 km from Umsawoti to Highflats (–AD), *Stirton 750, 751* (K; PRE); Hlutakungo (–AD), *Stirton 5563* (K; PRE); Umtwalumi Falls (–AD), *Stirton 743* (PRE); Vernon Crookes Nature Reserve (–BC), *Balkwill & Manning 980, 988* (NU). Umgaye (–BC), *Rudatis 559* (BM), *717* (BM; STE). Without precise locality *Krauss 475* (K; BM; US).

TRANSKEI.—3029 (Kokstad): Malowe Mountain (–BD), *Tyson 2698* (NBG; PRE), *5846* (PRE). 3129 (Port St Johns): 13 km NE of Ludongo Store (–AD), *Acocks 13425* (PRE); Ntsubane Forestry Station (–BC), *Galpin 10994* (PRE).

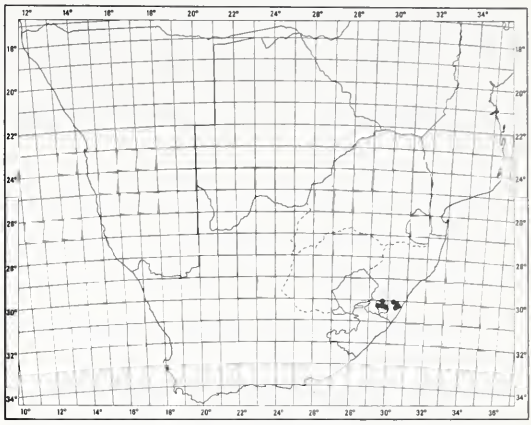

FIG. 13. — Known distribution of *Eriosema rossii.*

Eriosema rossii is named in honour of Dr James Ross in recognition of his important contribution to our knowledge of southern African legumes, particularly the subfamilies Caesalpinioideae and Mimosoideae.

Although this species is fairly common within its distribution range, it was until recently poorly represented in herbaria. With its large stipules and small compact inflorescences it is generally easily separated from the other species in the *E. squarrosum* complex.

There is, however, a group of plants which may form part of this species. I have previously annotated this group in various herbaria as *E. superpositum* mss. It is allopatric with *E. rossii* and is separated from it by its long-peduncled, few-flowered box-like inflorescences held high above the sparsely pubescent subtending leaves. But since the intervening area between the two ranges has not been collected I do not wish to recognize it formally until more is known about the variation present in both groups.

The following brief description may be useful to collectors who might be fortunate to find plants of this unnamed group which grows in small scattered colonies.

Erect perennial arising from a daucate rootstock with side branches arising from just below the stylopodium; younger rootstocks constricted. *Stems* 1–5, branching once or twice near base, densely clothed in 1–1,5 mm long, fulvous, semi-patent, downward pointing hairs with shorter hairs interspersed. *Leaves* trifoliolate, first leaves regularly narrowly ovate and unifoliolate; terminal leaflet 45–70 × 12–20 mm, sparsely covered in short, stiff, semi-erect hyaline hairs, under surface sparingly pubescent with numerous yellow glands present. *Stipules* 9–15 × 3–4 mm. *Racemes* axillary, with up to 12

flowers, box-like, congested at the apex of a long peduncle, greatly overtopping the leaves, 13 × 20 mm; peduncle 40–100 mm long. *Flowers* 7–9 mm long, longer than the subtending flower bract.

NATAL.—2930 (Pietermaritzburg): Inchanga (–DA), *Stirton 387b* (K; PRE); Key Ridge (–DC), *Stirton 555, 1126, 1365, 5077* (K; PRE); 3 km from Key Ridge to Durban (–DC), *Stirton 5546* (K; PRE); Botha's Hill (–DC), *Stirton 542* (K; PRE); near Durban (–DD), *Gerrard 423* (TCD); Wentworth (–DD) *Ward 6112* (PRE; NU), *5207* (NU) *6474* (NU); Treasure Beach (–DD), Bluff, *Ellery 39* (NU). 3030 (Port Shepstone): Umkomaas (–BB), *Stirton 8044* (PRE). Without precise locality: *Sanderson 278, 378.* (TCD); *Hutton s.n.* (TCD).

This taxon has disappeared rapidly from the area between Durban and Key Ridge and is now found only in a few isolated patches of the natural grassland that has not yet been built on or been destroyed through overgrazing.

7. **Eriosema latifolium** *(Benth. ex Harv.) C. H. Stirton,* comb. et stat. nov.

Eriosema squarrosum (Thunb.) Walp. var. *latifolium* Benth. ex Harv., Fl. Cap. 2: 260 (1862). *Eriosema zeyheri* E. Mey. var. *latifolium* Benth. ex Bak. f. in J. Bot., Lond. 33: 147 (1895). Lectotype: Natal, 'in graminosis circa stationem St. Andrews dictam', *Tyson 2834* (SAM; K, isolecto.).

Erect suffrutex up to 1 m tall. *Stems* up to 10, branching from the lower nodes, velvety. *Leaves* trifoliolate, basal leaves unifoliolate, 50–75 × 35–45 mm, symmetrical, obovate but also elliptic; laterals smaller, 45–60 × 20–30 mm, asymmetrical, gibbous, length-breadth ratio 1,3–1,5; densely pubescent above, dull greenish, densely woolly grey-white beneath with fulvous veins; densely glandular below but hidden beneath the hairs. *Stipules* 8–9(–11) × 5–6 mm, broadly ovate, tip somewhat falcate, free, clasping the stem. *Petiole* 3–5 mm long. *Racemes* axillary, 30–45-flowered, 11–22 mm long, held well above foliage; peduncles 30–75 mm long. *Flowers* (9)10–11 mm long, yellow; bracts 6–7 mm long, 2 mm wide, boat-shaped. *Calyx* 5,0–5,5 mm long, lobes equal; teeth 2 mm long, equal, shorter than the tube, long tawny-haired becoming appressed on the tube, glandular. *Standard* 11 mm long, narrowly obovate, clawed, weakly auriculate, glandular and pubescent on the back; appendages weakly developed, fused, thinly ridged, extending on each side downwards to the auricles but ending 1,5 mm away from them. *Wing petals* 11,0–11,5 × 2,5–3,0 mm, narrowly cultrate, slightly hairy along the base, somewhat pouched near the poorly developed auricle, sparsely glandular, longer than the keel blades. *Keel blades* 8,5–9,0 mm long, up to 3,5–4,5 mm wide; densely glandular, hairy along the base. *Staminal sheath* 8 mm long; free stamen geniculate; pollen variable in size. *Pistil* 7 mm long; ovary 2,8–3,0 mm long, densely pubescent; height of curvature 3–4 mm; stigma capitate. *Fruits* unknown. Fig. 14.

This species is endemic to southern Natal and the north-eastern Transkei (Fig. 15). It occurs in open grassland, both near riverine and mountain forests. Flowering takes place in October and November.

NATAL.—3030 (Port Shepstone): 18 km from Izingolweni to Port Edward, (–CC), *Stirton 1385* (K; PRE).

TRANSKEI.—3029 (Kokstad): 86,5 km from Lusikisiki to Port Edward (–DD), *Grobbelaar 2321* (PRU); Bizana (–DD), *Stirton 5599* (PRE; K). 3129 (Port St Johns): St Andrews Station (–BC),

FIG. 14. — Representative specimen of *Eriosema latifolium* *(Strey 10132).*

Tyson 2834 (K; NBG); Goss Point (–BD), *Strey 10132* (PRE; K). Without precise locality: near Umkwani River, *Tyson 2633* (NBG); *Anonymous 559* (W).

Although described by Harvey as long ago as 1862 this species has been collected only rarely. It occupies Acocks's Veld Type 3, his Pondoland Coastal Plateau Sourveld. This veld type has until recently been little explored and I am certain that once a full enumeration has been made of its constituents it will receive the recognition it deserves as an area of endemism.

Eriosema latifolium is closely allied to *E. dregei* (no. 5) and *E. luteopetalum* (no. 3), two other yellow-flowered suffrutices from the same general region. It differs from these two species in its much smaller flowers, the appendages on the standard being well-free of the auricles, its shorter stipules and narrowly oblong racemes.

The presence of variably sized pollen grains strongly suggests that this species may be of hybrid origin. It is perhaps significant that this species occurs as scattered individuals or small colonies. The few fruits that have been found contained shrivelled seeds only.

8. **Eriosema preptum** *C. H. Stirton* in Bothalia 13:323 (1981). Type: Natal, 2930 (Pietermaritzburg): Scottsville, Pietermaritzburg (–CB), *Stirton 1242* (PRE, holo.; K, iso.).

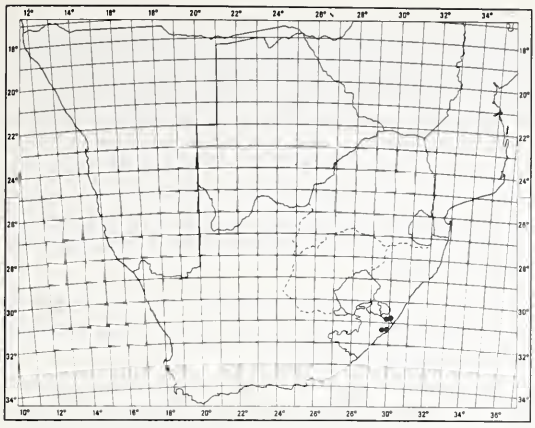

FIG. 15. — Known distribution of *Eriosema latifolium.*

Perennial herb or suffrutex 200–600 mm tall. *Stems* 1–15, clothed in short white hairs with longer hairs interspersed. *Rootstock* with long stylopodium, thin and beaded when young, becoming wavy or constricted but finally daucate when mature. *Leaves* trifoliolate, basal leaves usually unifoliolate, 45–60 × 20–30 mm; laterals smaller, less symmetrical, elliptic to narrowly obovate, if unifoliolate then obovate, apex subacute, base cuneate; sparsely pubescent above, densely woolly below with veins prominent due to dense covering of longer appressed hairs, glandular. *Stipules* 8–14 mm long, free. *Racemes* axillary, (8–)25–35-flowered, overtopping the subtending leaves. *Flowers* 6–7 mm long, up to 3 mm wide, orange with red veins or yellow-orange; bracts 4–6 mm long, rapidly caducous. *Calyx* 4 mm long, tube 2 mm long; keel lobe up to 3,5 mm long, teeth triangular. *Standard* 6–10 × 6 mm, emarginate with well developed downward curving auricles, clawed; back hairy and glandular; appendages present, fused, extending from auricle to auricle just above the apex of the claw. *Wing petals* 8–9 × 2,0–2,75 mm, auriculate, upcurving, longer than keel. *Keel petals* 6–7 mm long, up to 3–4 mm wide, pouched, gland-dotted. *Staminal sheath* 6 mm long; tenth stamen free. *Pistil* 6–7 mm long; ovary 2,5 mm long, densely hairy; style thickest at point of flexure, hairy for $\frac{3}{4}$ its length, height of curvature 2 mm. *Nectary* present, 0,2–0,3 mm high, margin wavy. *Fruits* 10–13 × 8–10 mm, sericeous. *Seeds* grey or light brown, with speckles or blotches. Fig. 16.

FIG. 16. — Representative specimen of *Eriosema preptum (Stirton 1244).*

Eriosema preptum is endemic to Natal and extends some 100 km inland from the coastal belt (Fig. 17). It occurs in Acocks's Coastal Forest and Thornveld (VT1), Ngongoni Veld (VT5) and his Zululand Thornveld (VT6). It favours sandy, well drained sites along roadsides and ditches but is also commonly found in regularly burned grassland. Flowering extends from September to February but occurs mainly in October.

NATAL.—2830 (Dundee): Scottspoort (–CC), *Thode 4418* (STE). 2831 (Nkandla): 6 km S of Hlabisa (–BB), *Codd 2003* (K; PRE); 10 km from Eshowe to Gingindlovu (–CD), *Stirton 5349* (PRE). 2930 (Pietermaritzburg): Scottsville (–CB), *Stirton 1242, 1410, 5516* (K; PRE); *Goossens 126* (G); behind Oribi Aerodrome (–CB), *Stirton 1244* (K; PRE); Camperdown (–DA), *Stirton 5542* (PRE); 5 km from Table Mountain to Pietermaritzburg (–DA), *Stirton 1032* (K; PRE). 2931 (Stanger): 43 km from Stanger to Mtunzini (–AB), *Stirton 407, 1001* (K; PRE); Tugela Monument (–AB), *Grobbelaar 1810* (PRU); Umhlali (–AD), *Meebold 13364* (NY); 10 km from Durban to Stanger (–AD), *Stirton 1254* (K; PRE); Gingindlovu (–BA), *Stirton 1256* (K; PRE); near Compensation (–BA), *Stirton 1160* (K; PRE); Kanyile Monument (–CD), *Grobbelaar 2325* (PRU). 3030 (Port Shepstone): Pumula (–BB), *Stirton 10343* (NU); Clydesdale (–BD), *Tyson s.n.* (NBG); 8 km from Eston to Winklespruit (–BB), *Stirton 1122* (K; PRE); 19 km from turn-off to Oribi Gorge Hotel on road to Paddock (–CA), *Germishuizen 1690* (PRE); Southbroom (–CB), *Schrire 318* (NU); 3 km from Port Shepstone to Margate (–CD), *Stirton 8050* (PRE).

Eriosema preptum hybridizes with *E. cordatum* E. Mey. and *E. salignum* E. Mey. (Stirton 1981b). The hybrid progeny are rather robust and are well represented in herbaria. Their presence in herbaria has however obscured the boundaries of what are three quite distinct species.

This species is related to *E. rossii* (no. 6) and its variants but is separated by its fewer-flowered well exserted racemes, much smaller, rapidly caducous flower bracts, smaller flowers and more woolly leaflets.

SPECIES EXCLUDED FROM THE COMPLEX

During the course of this study I have come across several specific epithets which have been attributed

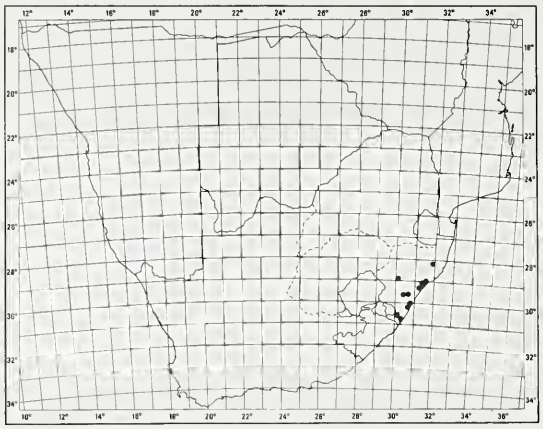

FIG. 17. — Known distribution of *Eriosema preptum*.

to the *E. squarrosum* complex. I have not been able to verify the identity of all of these names. The following notes should however clarify the position of some of them.

1. *Eriosema dregei* Meissn., in Krauss (*Flora* 27: 357, 1844), nomen. Krauss never published this name but used it to identify material he saw of *Eriosema parviflorum* E. Mey.

2. *Eriosema puberulum* Eckl. & Zeyh. (*Enum.* 256, 1836) = *Rhynchosia puberula* (Eckl. & Zeyh.) Steud.

3. *Eriosema reticulatum* E. Mey. (*Comm.* 129, 1836) = *Rhynchosia* sp. There is a specimen of *E. salignum* E. Mey. in P, collected by Drège, which is annotated by E. Meyer as *E. reticulatum* E. Mey. This is clearly a misidentification as the specimen does not match the protologue of *E. reticulatum*.

4. *Eriosema rogersii* Schinz = *Rhynchosia barbertonensis* C. H. Stirton, nom. nov. *Eriosema rogersii* Schinz in *Vjschr. naturf. Ges. Zürich* 71: 138 (1926); non *R. rogersii* Schinz in *Vjschr. naturf. Ges. Zürich* 71: 137 (1926). Type: Transvaal, Barberton, *Thorncroft* leg. *Rogers 19157* (Z, holo.; BM, fragment).

5. *Eriosema sericeum* Eckl. & Zeyh. (*Enum.* 256, 1836). = *Rhynchosia* sp.

6. *Eriosema transvaalense* Moss ex P. Glover (*S. Afr. J. Sci.* 34: 247, 1937), nomen.

7. *Eriosema trinerve* E. Mey. (*Comm.* 130, 1836). I have seen only one specimen annotated as such by E. Meyer. This specimen is not an *Eriosema*. Dr. R. M. Harley (Kew) has kindly named it as *Micromeria* sp. (Lamiaceae). There is a note written by the late Dr J. Raynal in the Paris Herbarium (27–6–1963) to suggest that 'this is probably an incorrectly labelled plant'. The protologue of this species is too vague and as it could be applied to any of a number of species it cannot be applied until a specimen so named is found.

8. *Eriosema villosum* (Meissn.) C. A. Sm. ex Burtt Davy (*Fl. Transv.* 2: 413, 1932). = *Rhynchosia villosa* (Meissn.) Druce.

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I thank the Directors and staff of all the cited herbaria who supplied material and other information; Messrs G. Germishuizen, G. B. Harding and B. Schrire who accompanied me on field trips to study material *in situ;* Mrs A. Romanowski for the photographs of type specimens, and Mr M. Svanderlik (Kew) for photographs of the distribution maps.

UITTREKSEL

Alle digbehaarde Suider-Afrikaanse spesies van Eriosema *is oor die jare gewoonweg onder* E. squarrosum *(Thunb.) Walp. geplaas. Hierdie studie klaar die identiteit van* E. squarrosum *op; drie nuwe taksons word erken:* E. **luteopetalum** *C. H. Stirton,* E. **rossii** *C. H. Stirton en* E. **umtamvunense** *C. H. Stirton; twee nuwe kombinasies word gemaak:* E. **latifolium** *(Benth. ex Harv.) C. H. Stirton en* E. **acuminatum** *(Eckl. & Zeyh.) C. H. Stirton; en* E. dregei *E. Mey. word herstel. Die spesie* E. preptum *C. H. Stirton, wat reeds beskryf is, behoort ook tot hierdie kompleks.* Rhynchosia **barbertonensis** *C. H. Stirton word as nuwe naam vir* E. rogersii *Schinz gegee.*

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Bothalia 16,1: 23–27 (1986)

Studies in the genus *Riccia* (Marchantiales) from southern Africa. 2. A new species of the section *Pilifer: R. sarcosa*

O. H. VOLK* and S. M. PEROLD**

Keywords: dorsal epithelium, Marchantiales, *Riccia sarcosa* sp. nov., section *Pilifer*

ABSTRACT

Riccia **sarcosa** Volk & Perold, a new species endemic to southern Africa is described. This species belongs to the section *Pilifer* Volk (1983), which now comprises 8 species characterized by the dorsal epithelium consisting of loose cell pillars. *R.* **sarcosa** is recognized by the distinct white margins of the thallus, by inconspicuous hyaline scales that do not extend above the thallus margins and by the spore ornamentation consisting of round, deep-set areolae or foveae.

Riccia sarcosa *Volk & Perold,* sp. nov. sectionis *Pilifer, R. duthiae* similis sed thallo marginibus albis sporisque foveolis bene impressis differt.

Thallus dioecius mediocris, lobis ad 10 mm longis, 1,5–3 mm latis, 1–1,5 mm crassis, obovatis, apice sulcatis; superficies dorsalis velutina, virella, leviter concava, marginibus albis. *Frons* in sectione transversali: stratum piliferum (epithelium) pilis liberis gradatim contractis 3–4 cellulis seriatis; chlorenchyma columnis 8–10-cellularibus canalibusque aeriferibus tenuibus. *Squamae* imbricatae, hyalinae, margines thalli aegre superantes. *Sporangia* dorsaliter protuberantia. *Sporae* 90–130 µm diametro, triangulo-globosae polares, ochraceae, ala angusta, 6–12 foveolis in diametro. Chromosomatum numerus n = 8 (Bornefeld 1985).

TYPE.—Cape, 3224 (Graaff-Reinet): Aberdeen, next to road R57, 2 km north-east of junction with R61, at shallow edges of vleis temporarily damp or occasionally inundated (–AC), 1981.04.11, *Volk 81–274b* (M; PRE), associated with *R. duthieae, Marsilia burchellii, Crassula* spp., *Ruschia* spp., *Chloris virgata* and thick layers of Cyanophyceae. On clayey soil, pH 6.5–6.9.

Thallus dioecious, perennial, gregarious or in incomplete rosettes up to 20 mm across, medium-sized, lobes up to 10 mm long, 1,5–3 mm broad, 1–1,5 mm thick (Fig. 1.1, 1.2; Table 1), obovate, narrow at base, widening distally, occasionally single, usually 2 to 3 times furcate, some segments branching again close to apex; branches variously divergent: main branches often parallel at initial dichotomy, subsequent branches usually more widely divergent (Fig. 1.1); in dense populations segments mostly elongated and small; dorsal surface when dry whitish green, somewhat felt-like, apex and sides with hyaline scales inflexed; when turgid, bright green, glistening, velvety, older parts and along margins white, sulcate at apex and shortly emarginate, slightly concave to flat, scales only prominent at apex. *Thallus branches* in transverse section 1,5 to 2,5 times as broad as thick; dorsal surface with shallow depression in centre, margins acute; flanks steeply ascending, sloping slightly outwards near apex, pale green, sometimes flecked with reddish purple; ventral surface slightly convex, greenish; dorsal covering of epithelial cells (Figs 1.2, 1.3; 2.2–2.4) about $\frac{1-2}{10}$ the thickness of transverse section, consisting of loose cell pillars varying from 130–*180*–220 µm in length (Tables 1 & 2), each pillar with 3–4 empty, delicate and inflated, hyaline cells, basal cells up to 80 µm wide and occasionally giving rise to unicellular globular outgrowths in spaces between pillars, thus reducing sizes of air-spaces above intercellular channels (Fig. 2.2–2.4), pillars tapering to smaller terminal apical cells about 33 µm wide, their shapes conical, mammillate or globular, giving dorsal surface of thallus a somewhat papillose appearance when viewed from above (Fig. 2.1); assimilation tissue (chlorenchyma) $\frac{4-5}{10}$ the thickness of section, 320–*510*–640 µm thick (Fig. 1.2; Table 1), consisting of columns or plates one cell thick, 8–10 cuboidal cells high, and enclosing 4–6–8-sided air-channels (Fig. 1.4); storage tissue $\frac{3-4}{10}$ the thickness of section, 320–*400*–470 µm thick (Fig. 1.2; Table 1), with closely packed, rounded or hexagonal cells, average diameter 50 µm; rhizoids arising from flat epidermal cells of ventral surface or from bases of scales, about 30 µm wide, mostly smooth. *Scales* closely imbricate, semicircular, 1 000–1 500 µm long and 600 µm broad, hyaline or white, basal cells often reddish purple; almost as broad as thickness of thallus, scarcely projecting above thallus margin; cells oblong-hexagonal, 110 µm long × 35 µm wide, smaller at margin, 35 µm long × 30–40 µm wide, cell walls straight (Fig. 1.2, 1.5). *Antheridia* not seen. *Archegonia* near middle of thallus, their necks purple-brown. *Sporangia* bulging dorsally, 0,6–0,8 mm across, containing 250–450 spores. *Spores* 90–130 µm in diameter, triangular-globular, polar; ochre-coloured to dark brown, semi-transparent becoming opaque with age; wing narrow 2,5 µm wide, projecting slightly more at marginal angles, incised or with pore in spore wall, margin smooth to finely crenulate; ornamentation on distal face incompletely reticulate: in centre of spore 5–7 smaller areolae about 10 µm wide, surrounded by larger 25 µm wide areo-

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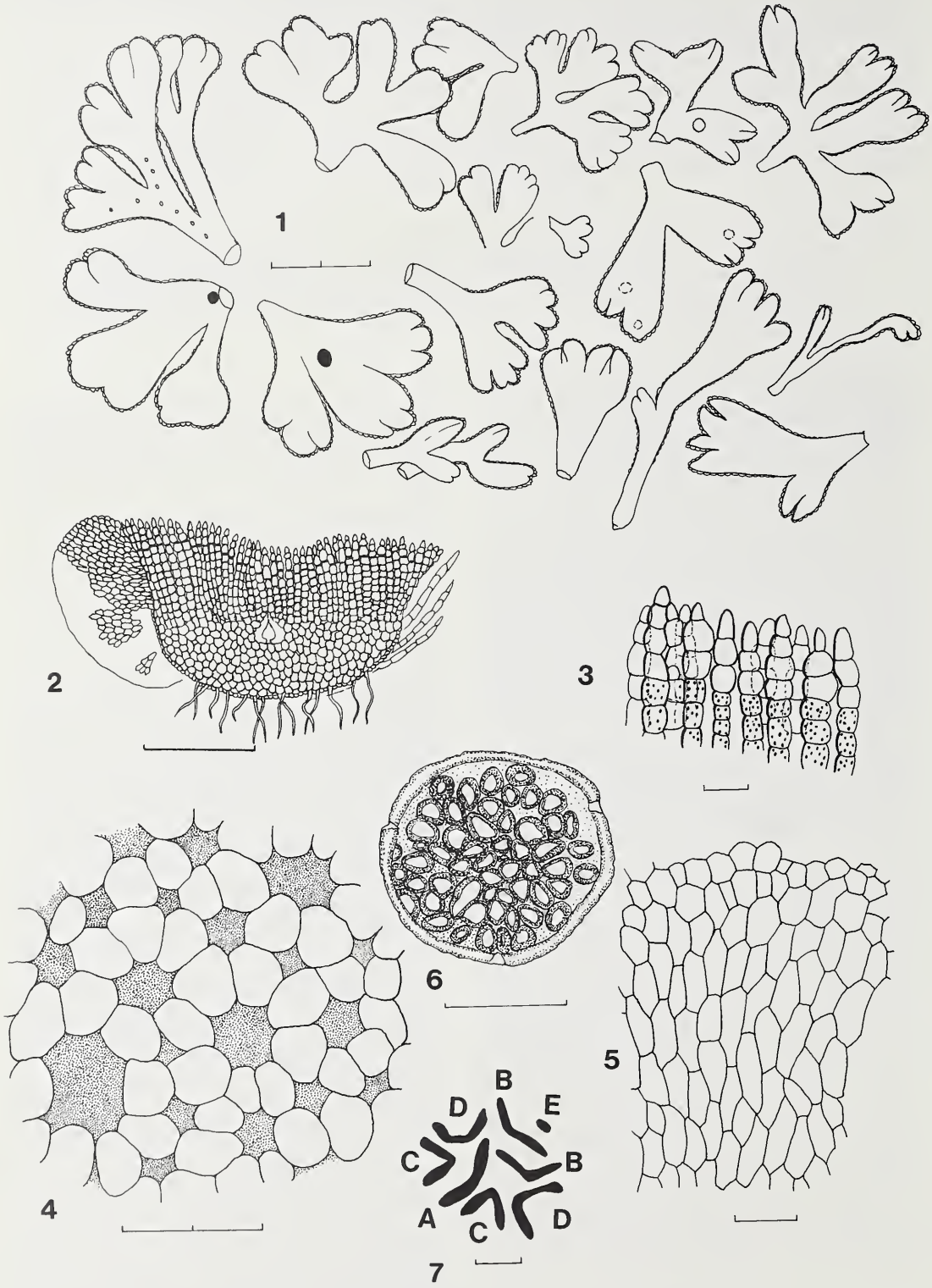

FIG. 1.—*Riccia sarcosa (Volk 81–274b* and *Volk 81–292b*, M, PRE). Structure of thallus, spores and chromosomes. 1, different habits; 2, transverse section of the thallus; 3, epithelial cells; 4, horizontal section through chlorenchyma; 5, part of ventral scale, 6, ornamentation of distal spore face; 7, chromosomes. (1–6, by O. H. Volk; 7, by T. Bornefeld). Scale bar on 1 = 4 mm; 2 = 500 μm; 3–5 = 100 μm; 6 = 50 μm; 7 = 1 μm.

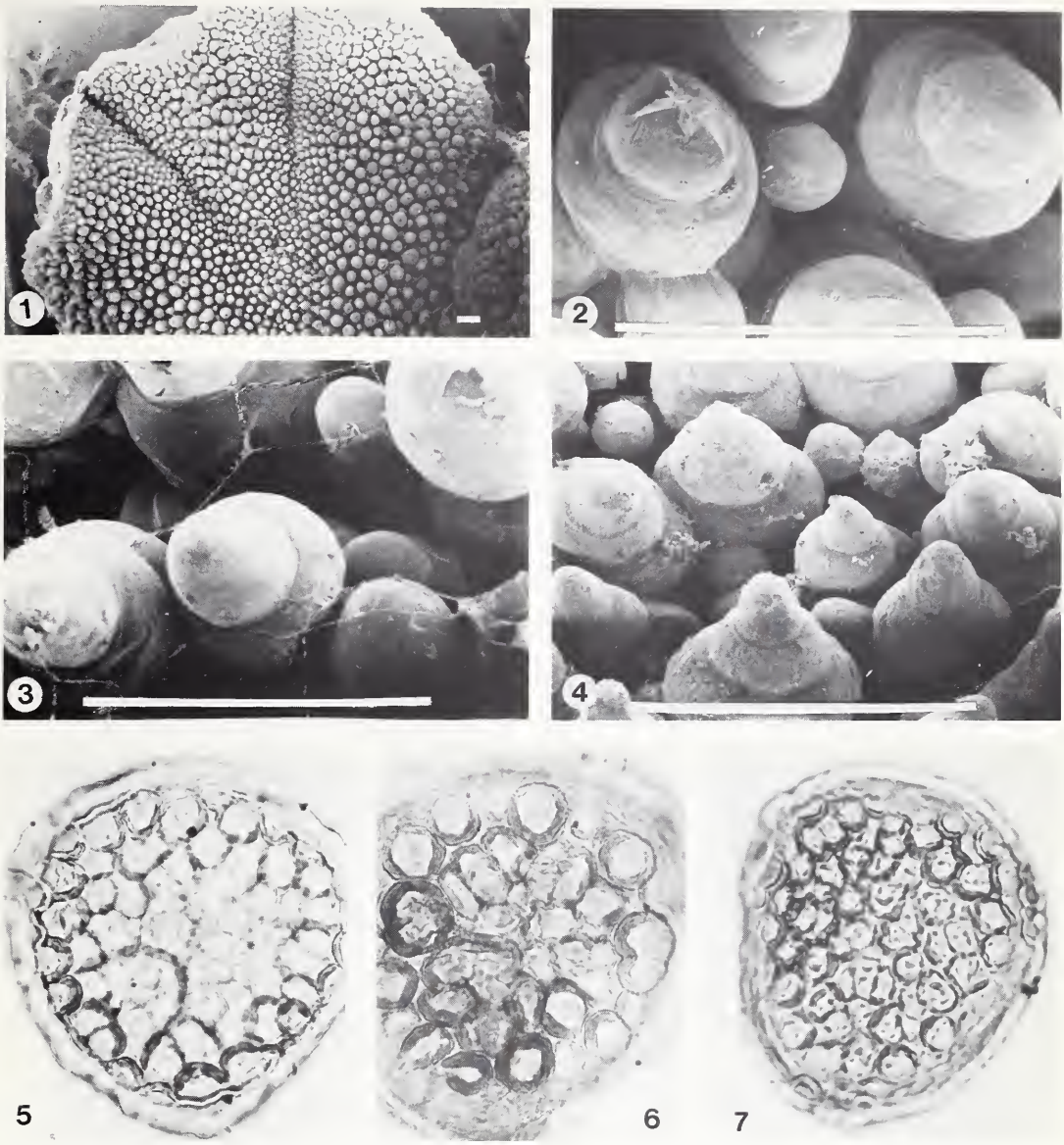

FIG. 2.—*Riccia sarcosa (Volk 81–274b* and *Volk 81–292b*, M, PRE). Thallus, epithelium and spores. 1, surface view of distal part of thallus; 2 & 3, epithelium viewed from above, showing interspatial outgrowths; 4, oblique view of same; 5–7, distal face of spores. [1–4, SEM micrographs by O. H. Volk; 5, 6, LM (light microscope) photographs by O. H. Volk; 7, LM photograph by S. M. Perold.] Scale bars on 1–4 = 50 μm; diameter of spores on 5–7 ca 100 μm.

lae, their borders thick, ring-like, often not reaching to wing (Figs 1.6; 2.5–2.7; 3.5, 3.6), some spores with 6–12 small pits or foveae across diameter; proximal face with triradiate mark distinct, areolae of facets (Fig. 3.1–3.4) about 7,5 μm wide, often with raised papillae at nodes; an area 10 μm wide between areolae and margin of spore, as well as narrow strips flanking parts of triradiate mark, without ornamentation (Fig. 3.1–3.4). Chromosome number n = 8 (Bornefeld 1984); the letters A–E (Fig. 1.7) identify the chromosomes according to Bornefeld (1984).

R. sarcosa is distinguished from the other seven species in the section *Pilifer* by the distinct white margin of the thallus, by its mostly inconspicuous scales that do not project above the thallus margin, and by the dorsal epithelial cell pillars which often

TABLE 1.—*R. sarcosa*, measurements on transverse section (cultivated plants of *Volk 81–274b* and *Volk 81–292b)*

Breadth of thallus : 2,1–2,3–2,7 mm
Thickness of thallus : 1,0–1,3–1,5 mm
Thickness of epithelium : 130–180–220 μm, ca $\frac{1-2}{10}$ thickness of thallus
Thickness of chlorenchyma : 320–510–640 μm, ca $\frac{4-5}{10}$ thickness of thallus
Thickness of storage tissue : 320–400–470 μm, ca $\frac{3-4}{10}$ thickness of thallus

have inflated basal and smaller terminal cells. The ornamentation of the spore wall is also distinctly different with deep-set, ringed areolae or foveae.

The type specimen, *Volk 81–274b,* was part of a mixed collection of *R. duthieae (Volk 82–274)* and was only recognized as a new species when plants from this collection were cultivated. A further specimen of *R. sarcosa* was isolated from a gathering of *R. albomarginata, (Volk 81–292)* (see Volk 1983) collected in the Willem Pretorius Wildtuin about 25 km E of the Park office on shallow soil over flat rock plates, temporarily wet and growing together with *Crassula* spp., *Ruschia indurata* (L. Bol.) Schwant., *Anacampseros* spp., *Oropetium* spp., *Riccia volkii* etc. pH of soil 6,2. A third specimen of this rare species was recently collected by J. M. Perold 10 km S of Ladybrand on shallow soil overlying a flat rocky outcrop. Fig. 4.

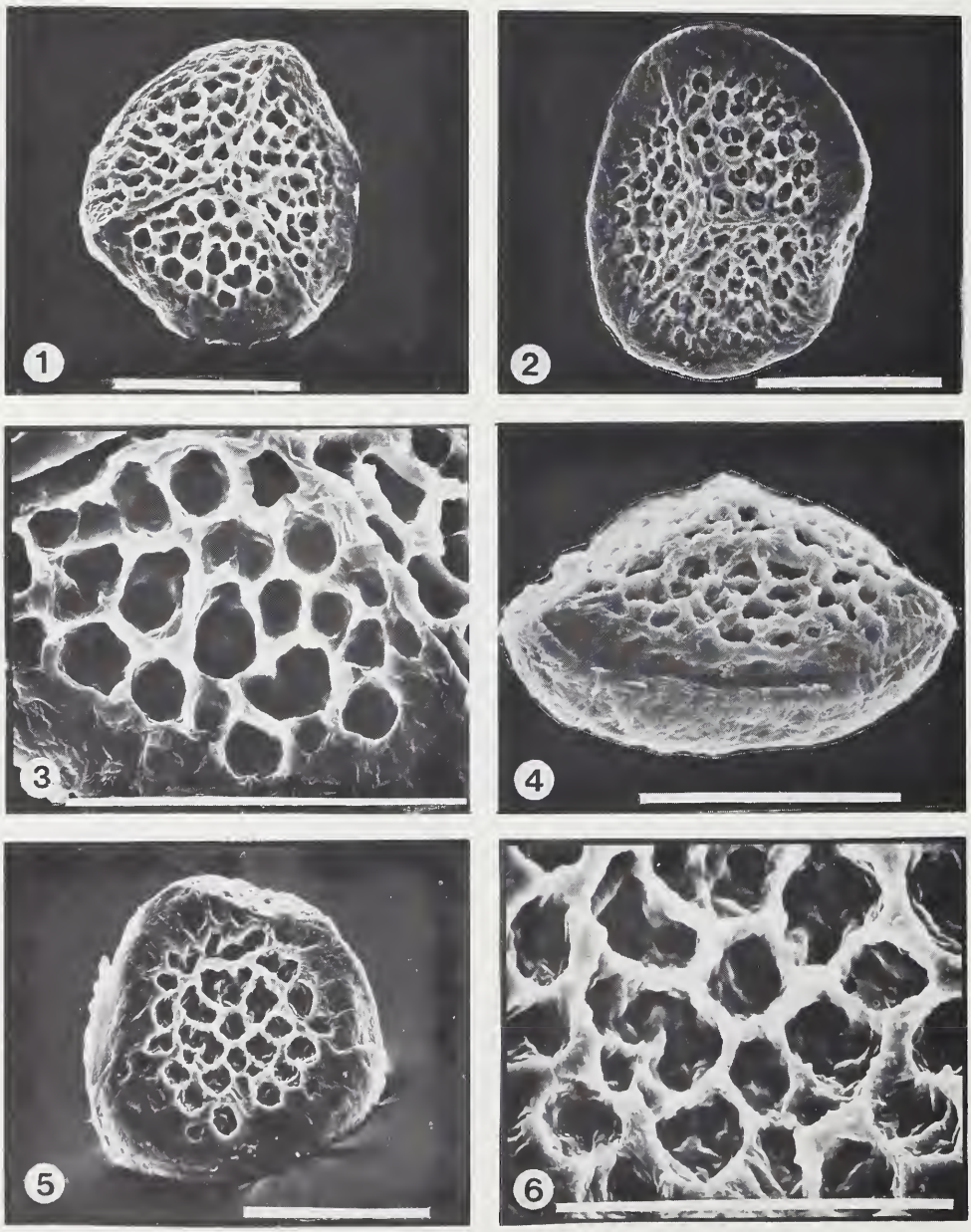

FIG. 3.—*Riccia sarcosa (Volk 81–292b,* **M, PRE**). **Spores. 1 & 2, proximal face;** 3, areolae on one of proximal facets; 4, viewed from side; 5, distal face; 6, areolae on distal face. (SEM micrographs by S. M. Perold). Scale bars = 50 μm.

TABLE 2.—*R. sarcosa*, size (in μm) of the 3–4 cells of the epithelial pillars and of cells of the chlorenchyma in transverse section (cultivated plants of *Volk 81–274b* and *Volk 81–292b)*

	Average size		Length : Breadth	Variations in size	
	Length	Breadth		Length	Breadth
Terminal cell	46	33	1,4:1	28–75	20–40
Middle cell(s)	53	50	1:1	38–70	44–60
Basal cell (if 3 cells in pillar)	63	60	1:1	40–100	48–80
Basal cell (if 4 cells in pillar)	55	56	1:1	40–60	50–70
Total length of pillar	190			160–200	
Chlorenchyma cells					
Volk 81–274b	48	45	1,1:1	40–60	36–56
Volk 81–292b	44	57	0,8:1	40–52	50–60

OFS.—2827 (Senekal): Willem Pretorius Game Reserve (–AC), *Volk 81–292b* (M; PRE). 2927 (Maseru): Ladybrand, 10 km S (–AB), *J. M. Perold 35* (PRE).

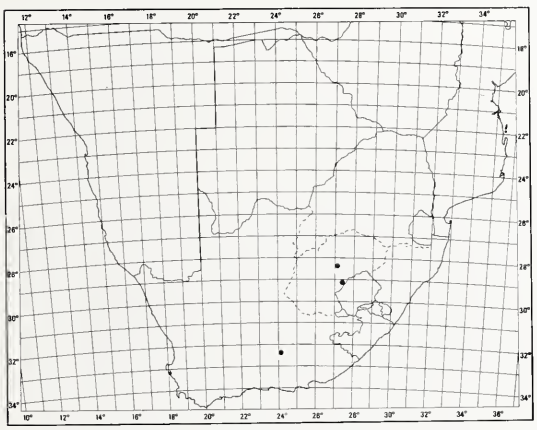

FIG. 4.—Map showing distribution of *R. sarcosa*.

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The authors wish to thank Dr. habil. T. Bornefeld, Am Reele 1, D–8706 Höchberg, Würzburg, Germany, for the chromosome counts and figures.

UITTREKSEL

Riccia **sarcosa** *Volk & Perold, 'n nuwe spesie endemies in suidelike Afrika, word beskryf. Hierdie spesie behoort tot die seksie* Pilifer *Volk (1983), wat nou 8 spesies behels en wat gekenmerk word deur 'n dorsale epiteel wat uit los selpilare bestaan.* R. **sarcosa** *word erken aan die wit rande van die tallus, aan die onopvallende deurskynende skubbe wat nie by die tallusrand verbysteek nie en aan die ornamentasie van die spore wat uit ronde diep ingesonke areole of putjies bestaan.*

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Bothalia 16,1: 29–33 (1986)

Studies in the genus *Riccia* (Marchantiales) from southern Africa. 3. *R. schelpei*, a new species, in the new subgenus *Chartacea*

O. H. VOLK* and S. M. PEROLD**

Keywords: air-pores, dorsal epidermis, *Riccia*, subgenus *Chartacea*

ABSTRACT

Riccia **schelpei** Volk & Perold, sp. nov., endemic to the western Cape, is described. It is characterized by the parchment-like epidermis of the thallus, thick-walled hyaline epidermal cells and by dorsal air-pores encircled by a raised ring of smaller thin-walled cells. This species is the type of the new monotypic subgenus **Chartacea** Perold.

Chartacea *Perold,* subgen. nov. Ricciae L.

Textura thalli chartacea, inde nomen; epidermis indurata cellulis hyalinis parietibus incrassatis; pori aërii (stomata) annulo cellularum superpositarum parietibus tenuibus circumcincti.

TYPE. — *Riccia schelpei* Volk & Perold

Thallus dorsally with papery texture; epidermis parchment-like with thick-walled hyaline cells; air-pores surrounded by a ring of thin-walled superimposed cells.

Riccia schelpei *Volk & Perold,* sp. nov. *Thallus* monoicus (?), mediocris ad magnus; lobi ad 12 mm longi, 1,5–2 mm crassi, oblongo-ligulati; superficies dorsalis in sicco pallido-flavescens, chartacea, profunde sulcata, apice emarginato, marginibus late alatis. *Frons* in sectione transversali: chlorenchyma cavernulis aëriis latis polyedricis. *Epidermis* unistratosa, cellulis hyalinis parietibus incrassatis, poris aëriis annulo cellularum parvarum superpositarum parietibus tenuibus circumcinctis. *Squamae* inconspicuae, marginem frondis non superantes. *Sporangia* in sulco agglomerata. *Sporae* 95–105 µ diametro, triangulo-globulares, polares, rubello-bruneae, alatae, reticulo-foveolatae, 10–12 foveolis in diametro, plerumque granulosae. Chromosomatum numerus n = 8 (Bornefeld, 1984).

TYPE. — Cape, 2917 (Springbok): Hester Malan Res. Carolusberg (W), seepage area (–DB), 1977.09.14 *Schelpe 7775* (BOL; PRE) associated with *Bryum radiculosum* Brid., *B. argenteum* Hedw., *Chamaebryum pottioides* Thér. & Dix., *Riccia parvo-areolata* Volk & Perold, *Crassula* spp. and Cyanophyceae. On decomposed granitic soil, pH 7.

Thallus monoecious (?), perennial, in gregarious patches or single and scattered, medium-sized to large, lobes up to 12 mm long, simple or irregularly furcate, branches widely divergent, oblong-ligulate, winged, 1,5–2 mm thick, 2–3 times broader than thick, when dry 3–4 mm broad, dorsal surface yellow and parchment-like, only apical sides inflexed (Fig. 1.1a & 1b), opposing each other and sometimes clasped together, otherwise wings of thalli expanded and irregularly undulate; when turgid, up to 6 mm broad, dorsal surface green, somewhat greasy, reticulate with many scattered areolae, formed by faintly visible outlines of air-chambers, each with a single air-pore (Fig. 2.2); apex rounded, emarginate, sulcus deep towards apex, sides convex and sloping steeply; proximally groove shallow and wide (Figs 1.2; 2.1). *Thallus branches in transverse section* with deeply grooved surface on apical sections (Fig. 1.3a), on more proximal sections with wide shallow channel (Figs 1.3b; 2.5); margins of wings acute (Figs 1.3a & 3b; 1.7), attenuate and undulating, flanks sloping steeply up and outwards, occasionally flecked with purple near base; ventrally thickened, slightly rounded, greenish, with numerous smooth and some tuberculate rhizoids, laterally abruptly forming a wing which is without rhizoids (Fig. 1.3a & 3b); assimilation tissue (chlorenchyma) $\frac{3-4}{6}$ the thickness of section, about 600–850 (–1 000) µm thick, with polyhedral air-chambers up to 150 µm wide (Figs 1.4; 2.6), in larger plants 25–30 chambers across width of thallus, sloping very obliquely at bases, gradually curving upwards and becoming almost vertical towards surface, where each one opens via a small pore; each air-chamber enclosed by 6–8 chlorophyllose lamellae or plates, 1 cell thick, cells isodiametric, about 55 µm wide; storage tissue $\frac{2-3}{6}$, the thickness of section 300–500 µm thick, cells roundish, up to 70 µm wide, without starch, but rich in oil.

Epidermis unistratose, thick-walled, except for ventral rhizoid-bearing part; dorsal cells variously shaped, polygonal, with rounded corners (Fig. 1.5), 35–70 µm long, 30–50 µm wide and 10–40 µm high; air-chambers roofed over by 5–8 thick-walled epidermal cells centred around air-pores, each pore encircled by a slightly raised ring of 5–7 fragile, smaller cells 15–20 µm wide (Figs 1.5; 2.3), overlying and overlapping thick-walled epidermal cells, thus reducing diameters of pores to 5–20 µm; the pores resemble those of *Oxymitra;* distances between pores 80–140 µm; some of the epidermis cells bear unicellular club-shaped 'slime' papillae (Fig. 2.4), 40 × 20 µm, very thin-walled and easily destroyed, especially numerous around archegonia (Fig. 1.11 & 1.12); on transverse section of wing (Fig. 1.7), both dorsal and ventral cells thick-walled, but epidermal cells on dorsal surface of wings with irregularly thickened walls (Fig. 1.6), and on ventral surface of wings cells

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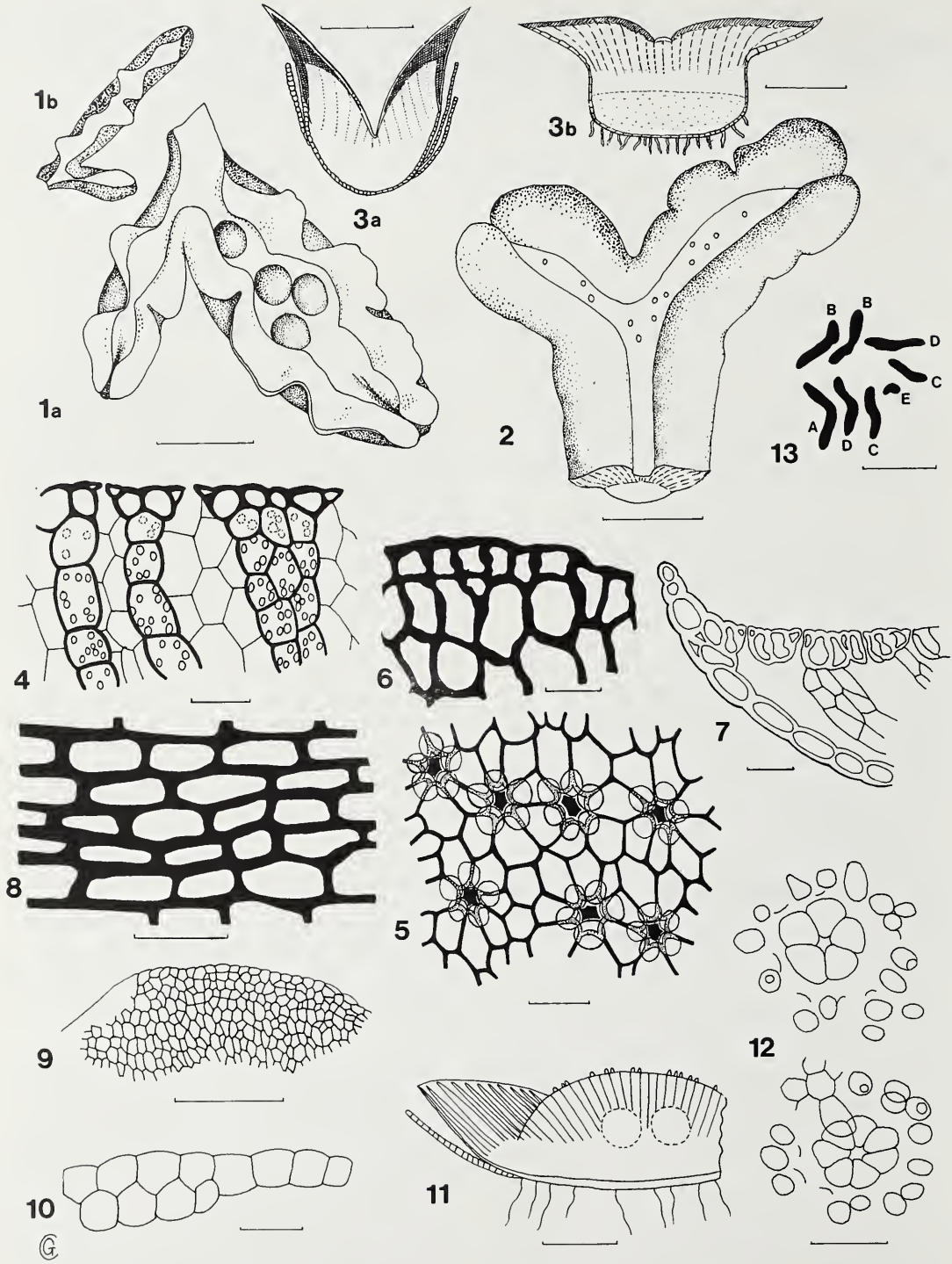

FIG. 1. — *Riccia schelpei* (*S. M. Perold 535*, PRE). Structure of the thallus, scales and chromosomes. 1, dry thalli: a, with several ripe sporangia; b, shrunken, sterile thallus; 2, fresh thallus; 3, branch of thallus in transverse section: a, during transition to resting phase, emptied cells in wing shaded, near apex deeply grooved; b, showing thick-walled epidermis, assimilation and storage tissue, proximally with shallow groove; 4, transverse section enlarged, showing epidermal cells, pores, air-chambers and chlorophyllose lamellae; 5, dorsal epidermis from above: pores (black) encircled by a ring of fragile cells overlying thick-walled epidermis cells; 6, epidermis on margin of wing, from above; 7, transverse section of wing: walls of dorsal and ventral epidermis thick-walled, but different in shape; 8, ventral epidermis at wings, cells thick-walled; 9, scale; 10, transverse section of bistratose base of scale; 11, longitudinal section of thallus through gametangia, 'slime' papillae and wing; 12, mouths of archegonia in deep depressions, from above, surrounded by 'slime' papillae; 13, chromosomes. (1–12, by O. H. Volk; 13, by T. Bornefeld). Scale bar 1, 2, 3 = 2 mm; 4, 5, 8, 10, 12 = 50 µm; 6, 7 = 100 µm; 9 = 500 µm; 11 = 1 mm; 13 = 1 µm.

uniformly thick-walled, rectangular (Fig. 1.8), up to 60 μm long, without air-pores or rhizoids. *Scales* imbricate, 300–500 μm broad and up to 1 500 μm long (Fig. 1.9), flush with and not projecting above thallus margin (Fig. 2.1), edge nearly smooth, hyaline, some scattered cells near base purple, cells oblong, 5–6-sided, 110 μm long and 50 μm wide, cell walls straight, at margins cells smaller, about 40 × 30 μm; in cross section cells bulging and base bistratose (Fig. 1.10). *Gametangia* in transient but well-defined groups along dorsal groove (Fig. 1.11); epidermis less complex here, but with large numbers of the fragile, blunt, 'slime' papillae; antheridia with short, hyaline ostioles; archegonia opening in deep cup-like depressions, surrounded by papillate cells (Fig. 1.12); subsequently, as the spores develop, the necks protrude up to about 200 μm, with bases purple-brown and tips hyaline, thin, almost thread-like. *Sporangia* crowded together or scattered along groove, bulging dorsally, containing 600–800 spores (over 1 000 in capsules of large plants) enclosed in red-brown sac, which later disintegrates. *Spores* (90–)95–105(–115) μm in diameter, triangular-globular, polar, reddish or yellowish brown when young, darkening to mahogany brown, opaque; wing 7,5 μm wide, margin crenulate and somewhat eroded, pore

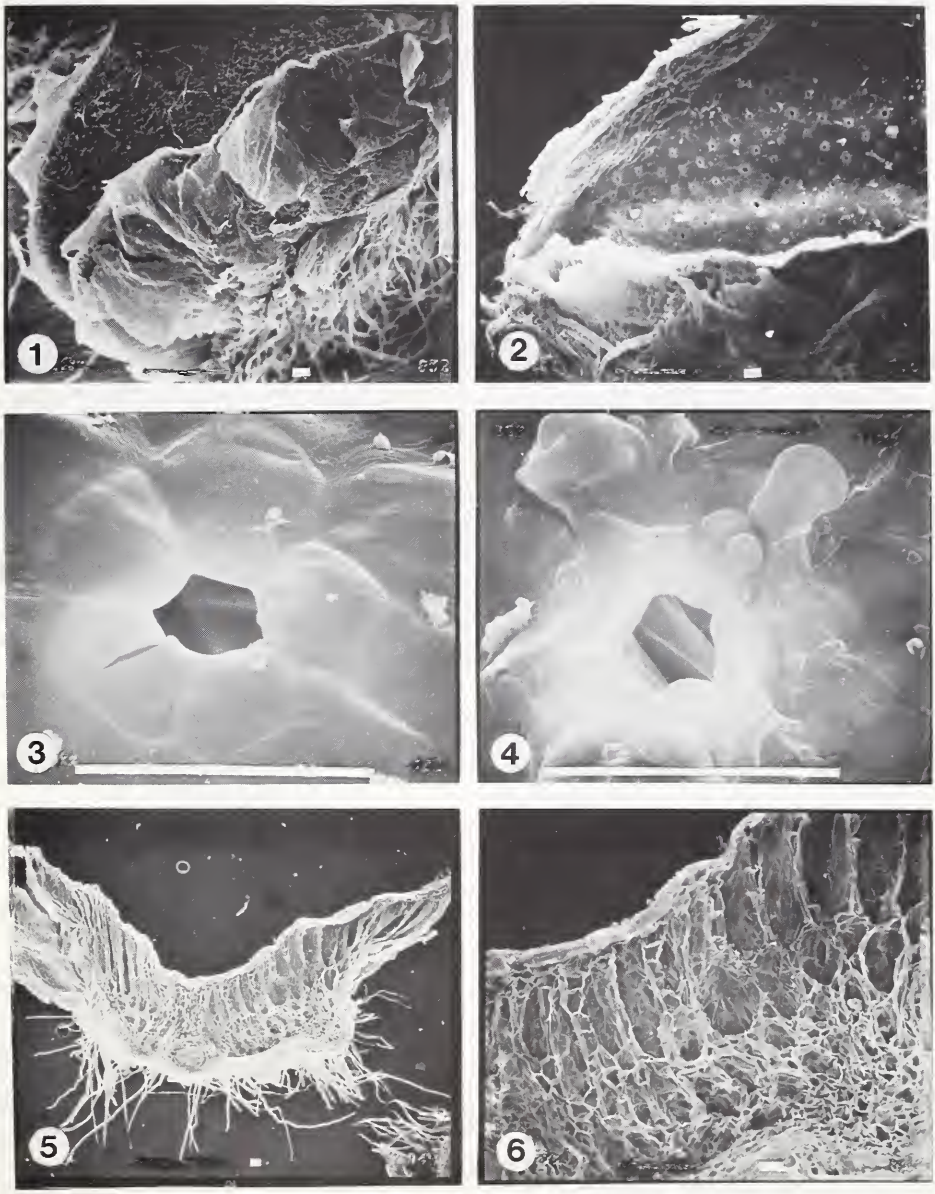

FIG. 2. — *Riccia schelpei* (*E. G. H. Oliver 8041*, PRE). Thallus, epidermal pores and air-chambers. 1, thallus near apex, showing scales; 2, air-pores on part of dorsal surface with margin and scales in foreground; 3, air-pore with 5 surrounding cells; 4, epidermis, air-pores, 'slime' papillae; 5, transverse section of thallus branch; 6, transverse section of air-chambers. (SEM micrographs by S. M. Perold). Scale bar on 1, 2, 5, 6 = 100 μm; on 3, 4 = 50 μm.

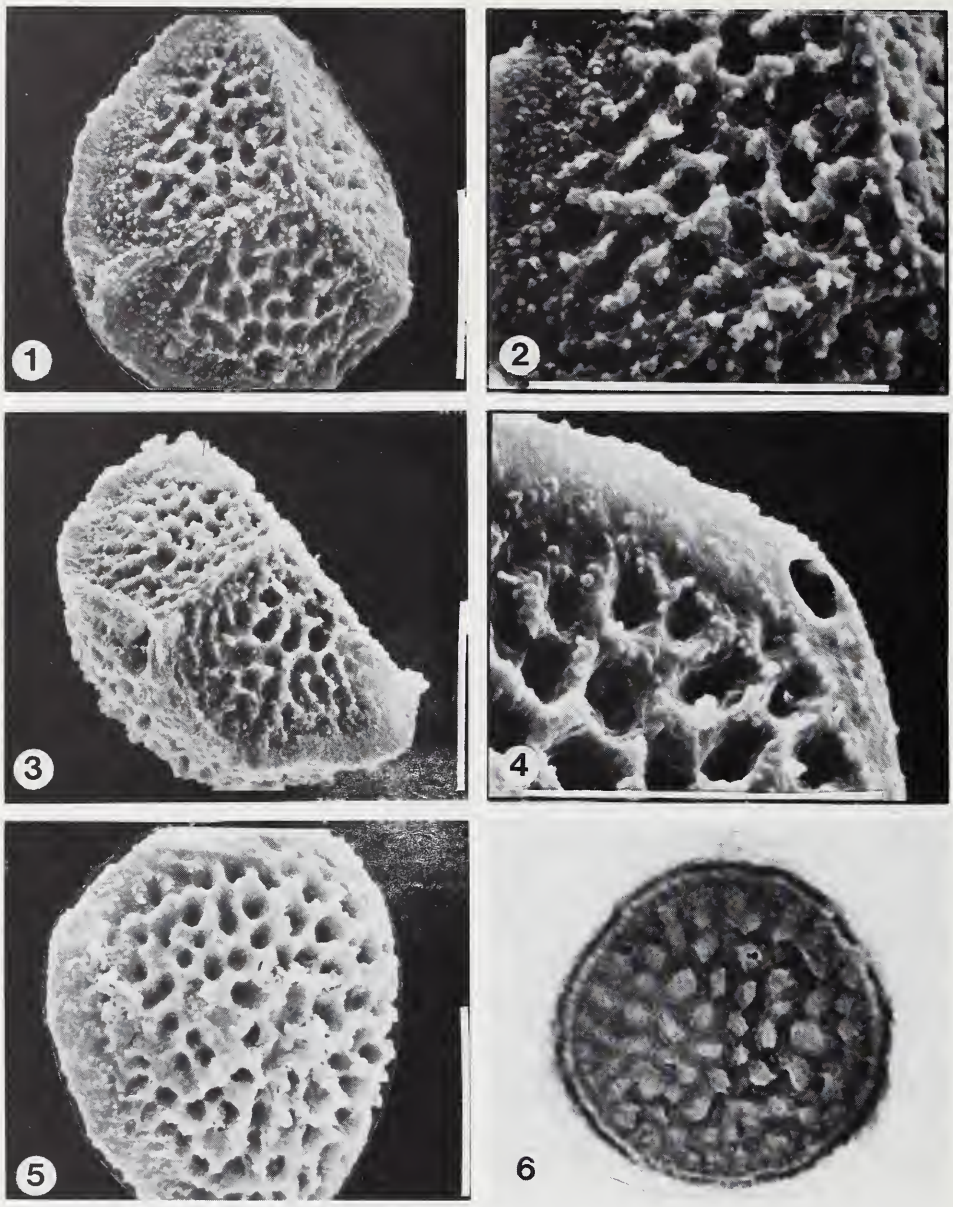

FIG. 3. — *Riccia schelpei* (*E. A. Schelpe 7775*, BOL). Spores. 1, proximal face; 2, apex; 3, viewed from side; 4, marginal pore and margin; 5, 6, distal face. (1–5, SEM micrographs; and 6, LM (light microscope) photographs, by S. M. Perold). Scale bar on 1–5 = 50 μm; diameter of spore on 6, ca 100 μm.

at each marginal angle 5–7,5 μm across (Fig. 3.4), distal face convex, reticulate-foveolate, with 9–10(–12) deep cup-like areolae across diameter of spore (Fig. 3.5, 3.6), each areola 10–12,5 μm wide, becoming somewhat smaller near margin, high ridges surrounding areolae and raised at nodes usually heavily encrusted with granules and papillae, but occasionally smoother; proximal face with apex blunt and sometimes acute, triradiate mark present, but partly obscured by granules, each facet with 15–20 small shallow areolae, surrounding ridges granulose (Fig. 3.1–3.3). Chromosome number n = 8 (Bornefeld 1984); the letters A–E (Fig. 1.13) identify the chromosomes according to Bornefeld (1984).

Under adverse conditions, the thalli become shrunken and transformed to dormant bulbils, as the peripheral cells lose their contents and form a protective covering (Fig. 1.1b). As with other *Riccia* species, the walls of the epidermal cells, of the empty cells and of the rhizoids, are stained a deep blue when treated with dilute Toluidine Blue N, whereas all other cell walls are reddish violet (Volk 1984).

R. schelpei is endemic to the western Cape, which is a winter rainfall region. It grows at seepages or on rocky outcrops, fully exposed to the sun, on acid to neutral (pH 5.0–7.0), well-drained soils, composed

of finely or coarsely decomposed granite, rich in dust. It may be associated with lichens, several small *Crassula* species, other *Riccia* species and with small mosses like *Archidium* and *Bryum*. *R. schelpei* has been named in honour of the late Prof. E. A. Schelpe, former curator of Bolus Herbarium, University of Cape Town, who collected the type specimen. Fig. 4.

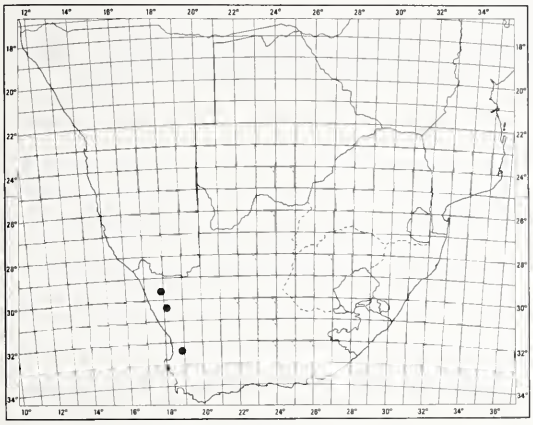

FIG. 4. — Map showing distribution of *R. schelpei*.

The parchment-like, and somewhat greasy epidermis, the air-pores with a ring of fragile cells superimposed over thick-walled, hyaline, epidermal cells, as well as the gametangia in well-defined stands, bear a resemblance to other genera of the *Marchantiales* e.g. *Oxymitracea*. These characters have necessitated placing *R. schelpei* in the new subgenus *Chartacea*, setting it apart from other members of the related subgenus *Spongodes*.

In addition to the type locality, collections were made at the following sites:

CAPE.—3018 (Kamiesberg): Plateau N of Leliefontein towards Draaiklip (–AC), *Oliver 8041* (PRE); 3218 (Clanwilliam): N of Citrusdal, above Olifants River (–BD), *S.M. Perold 535* (PRE).

ACKNOWLEDGEMENTS

The authors are grateful to the late Prof. E. A. Schelpe for the loan of his specimen from BOL and Dr habil. T Bornefeld, Am Reele I, D–8706 Höchberg, Würzburg, Germany, for the chromosome counts and figures. Sincere thanks are also due to Mr E. G. H. Oliver, Stellenbosch, for collecting and kindly sending us the specimen from Kamiesberg.

UITTREKSEL

Riccia **schelpei** *Volk & Perold, sp. nov., endemies tot die Wes-Kaap, word beskryf. Die spesie word gekenmerk deur die perkamentagtige dorsale oppervlak van die tallus, verdikte selwande van die dorsale epidermisselle, en deur dorsale porieë wat omring is deur 'n opgehewe kring van kleiner, dunwandige selle. Hierdie spesie is die tipe van die nuwe monotipiese subgenus* **Chartacea** *Perold.*

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Bothalia 16,1: 35–38 (1986)

The identity of *Erica vinacea* and notes on hybridization in *Erica*

E. G. H. OLIVER*

Keywords: *Erica fastigiata, E. fervida, E.* × *vinacea,* hybridization in *Erica*

ABSTRACT

The rediscovery of *Erica vinacea* L. Bol. among sympatric populations of two other species led to a comparison of their morphological characters. Results of this study indicate a putative hybrid origin: *E.* × *vinacea* L. Bol. = *E. fastigiata* L. × *E. fervida* L. Bol.

Recently Mr A. W. Schumann of Cape Town discovered *E. vinacea* L. Bol. north-west of Platberg in the Kogelberg Reserve. In this locality, which falls in the area indicated on the type specimen, *E. vinacea* was found growing as scattered plants throughout a large marsh dominated by the restiad, *Chondropetalum mucronatum* (Nees) Pillans. In the same marsh there occurred numerous plants of *E. fastigiata* L. and groups of *E. fervida* L. Bol. It was immediately suspected that the scattered plants were hybrids between the two more common species.

E. fastigiata is a common species in the area from the Hottentot's Holland Mountains to Hermanus where it can be sometimes abundant on moister slopes and in seepage zones. It is a highly variable species and has several closely allied species such as *E. walkeria* Andr., *E. daphniflora, E. hendricksei* H. A. Baker and *E. turrisbabylonica* H. A. Baker, none of which, however, occurs within the Kogelberg Reserve. *E. fastigiata* can easily be recognized by its very large spreading corolla lobes which are usually white to pale pink, the outside colour of the flowers being deep red. In the centre of each flower (see Fig. 1.1a) there is a darker area of red or green which acts as a nectar guide. The long foliage-like bract, bracteoles and sepals, together with the crowded imbricate leaves, hide most of the flower from view. The flowers are typically arranged in groups of four at the ends of the branches. In the area surrounding Platberg most of the collections of this species exhibit corolla tubes which are very slightly and finely hairy whereas elsewhere they are mostly glabrous.

E. fervida is a remarkable species closely allied to that rare and endangered species, *E. pillansii* H. Bol. Both have vivid scarlet, noticeably puberulous flowers and are endemic in the Kogelberg Reserve. The flowers are borne at the ends of very short lateral branchlets (brachyblasts) which are crowded along the main branches. *E. pillansii* has, however, much larger flowers and flowers in May/June, whereas *E. fervida* flowers in October/November.

E. vinacea has dark pinkish red flowers with small spreading lobes which have a slightly paler upper surface. The flowers are borne at the ends of short lateral branchlets (dolichoblasts) which are more loosely crowded towards the ends of the branches than in *E. fervida.*

A comparison of the main distinguishing characters of the three taxa is given in Table 1. From this table it can be seen that the main differences lie in the degree of hairiness of nearly all the organs, the inflorescence arrangement, flower shape and details of the anther and ovary. In most cases the characters of *E. vinacea* are intermediate between those of *E. fastigiata* and those of *E. fervida* and tend towards either one or the other.

The occurrence of scattered plants of *E. vinacea* amongst numerous plants of the other two species in the locality north-west of Platberg indicates that the plants are chance first generation crosses that have not become reproductively established. The plants of the putative hybrid appeared to be of the same age as those of the other two species and are thought to have grown up soon after the last fire in the area about 40 years ago. All three species are single-stemmed and must regenerate from seed after a fire. It was not possible to revisit the locality to check on seed-set and seed fertility.

Two other isolated populations of *E. vinacea* growing together with *E. fastigiata* and *E. fervida* have been reported (A. W. Schumann pers. comm.).

The pollen of the collection *Oliver 8611* is typical of the genus *Erica,* namely in tetrads, and did not show any abnormalities. The few species of *Erica* which have so far been investigated all have n=12 with extremely small chromosomes. A thorough investigation of the cytology of the three taxa may reveal some additional evidence on their relationships.

The facts as discussed above and set out in Table 1 indicate a putative hybrid origin of *E. vinacea* L. Bol. (*E.* × *vinacea* L. Bol. = *E. fastigiata* L. × *E. fervida* L. Bol.).

HYBRIDIZATION IN *ERICA*

The hybrid origin of *E.* × *vinacea* poses an intriguing question as to how such crosses took place. In a paper on pollination syndromes of *Erica* species in the south-western Cape (Rebelo *et al.* 1985), *E. fervida* is classified as being ornithophilous, involving species of sunbirds (Nectariniidae). *E. fastigiata* on the other hand is classified as being rhinomyio-

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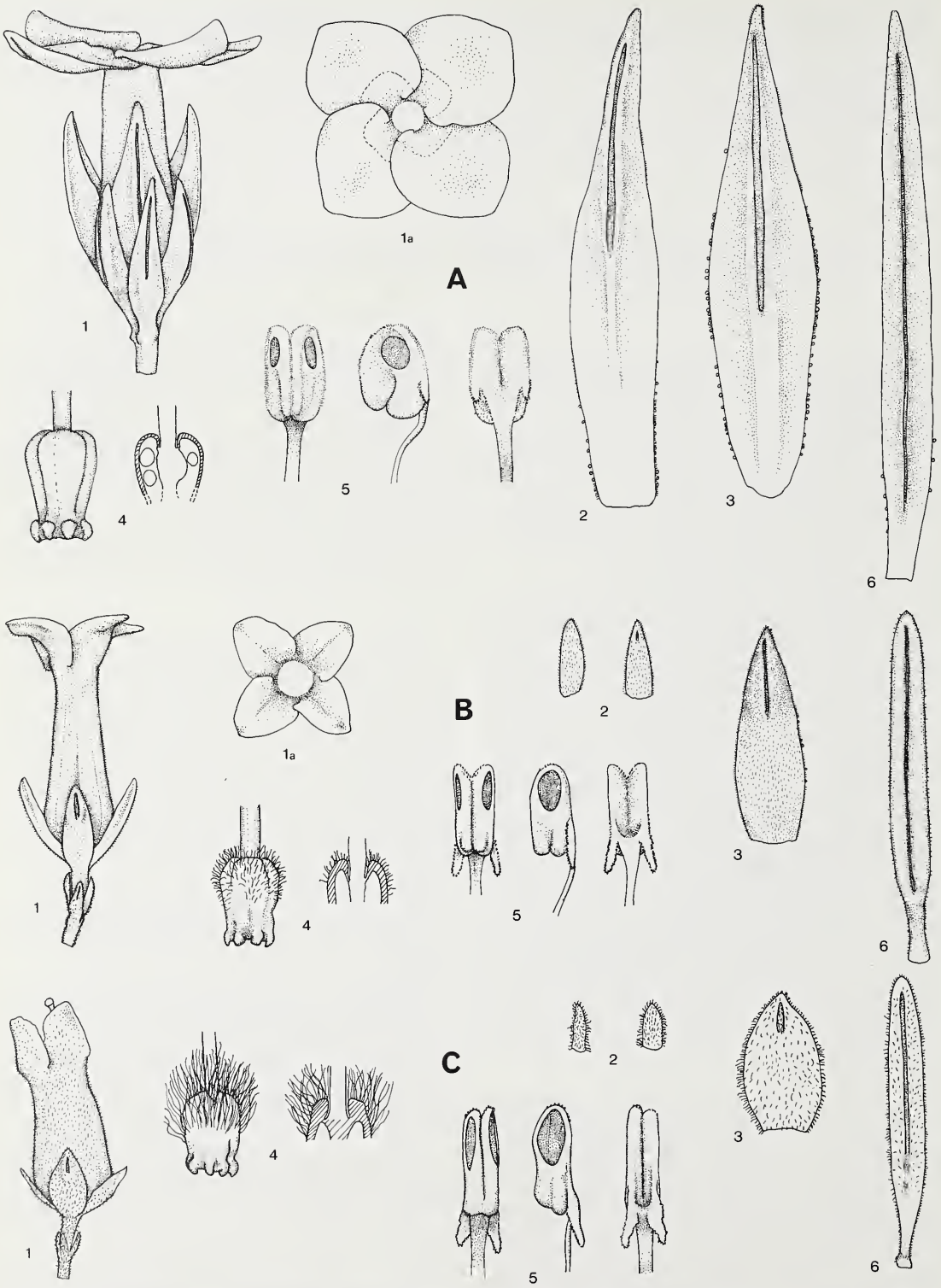

FIG. 1. —A, *Erica fastigiata*, B, *Erica* × *vinacea* and C, *Erica fervida*: 1, flower, × 6; la, flower from above, × 6; 2, bracteole and bract, × 12; 3, sepal, × 12; 4, anther, front, side and back views, × 25; 5, ovary and diagrammatic longitudinal section of upper half of ovary, × 12; 6, leaf, × 12. Drawn from *Oliver 8609, 8611 & 8610* (STE) respectively.

TABLE 1.—Comparison of morphological characters of *E. fastigiata*, *E.* × *vinacea* and *E. fervida*

	E. fastigiata	*E.* × *vinacea*	*E. fervida*
Branches	Sparsely pubescent	Shortly pubescent	Pubescent
Leaves	4-nate Erect imbricate Glabrous, ciliate with very short hairs and sessile glands	4-nate Erect Sparsely strigulose and ciliate	4-nate Erect spreading Sparsely pubescent and ciliate
Flowers	3–4-nate at ends of main branches and occasionally short dolichoblasts	(1)–3–(6)-nate at ends of short dolichoblasts somewhat crowded towards ends of branches	(1)–3–(4)-nate at ends of brachyblasts crowded along branches into congested synflorescences
Pedicels	Length ratio to corolla, 2:11 Glabrous to subglabrous	Length ratio to corolla, 3:7 Finely puberulous	Length ratio to corolla, 1:2 Distinctly puberulous
Bracts/ bracteoles	Large and foliar Approximate $^3/_4$ to as long as calyx Glabrous to subglabrous	Small and scarious Median Reaching base of calyx or slightly longer Finely puberulous	Small and scarious Median Not reaching calyx Puberulous
Calyx	$^3/_4$ to equal to corolla tube Elongate elliptic Carinate sulcate Naviculate Totally green or tinged red	$^1/_3$ – $^1/_2$ as long as corolla tube Ovate attenuate Slightly carinate sulcate Slightly naviculate Totally green or tinged red	$^1/_4$ as long as corolla tube Broadly ovate acute Very slightly sulcate Flat Totally scarlet
Corolla	Tube tubular-conical, dark red, glabrous to very minutely puberulous Lobes large, stellately spreading, distinctly & densely papillate, pale pink to white above with distinct nectar guides	Tube conical, dark pinkish red, minutely puberulous Lobes small partially spreading, minutely papillate, paler pink above with no guides	Tube tubular-campanulate, bright scarlet, puberulous Lobes small erect, glabrous, scarlet
Anthers	Thecae broadly elliptic Minute dorsal awns Pores $^1/_4$ as long as thecae	Thecae oblong Distinct subbasal awns Pores $^1/_3$ as long as thecae	Thecae oblong, subprognathous Distinct subbasal partially decurrent awns Pores $^1/_2$ as long as thecae
Ovary	Turbinate, stipitate Very slightly emarginate Glabrous	Obovoid, subsessile Emarginate Puberulous	Subcylindric, sessile Deeply emarginate Villous

philous, a term coined to describe the most discrete insect-pollination syndrome in *Erica* where pollination is performed by hovering dipterans with very long proboscises. In the latter situation the opening to the corolla tube is extremely small and the nectar guides are very prominent. It would seem then that there are two very different pollinating agents for the two parent species. This problem needs investigation in the field.

This is not the first time that hybridization has been recorded for *Erica*. Oliver (1977) considered *E.* × *flavisepala* Guth. & Bol. to be a putative hybrid between the very unlikely parent species *E. thunbergii* Montin and *E. spaerocephala* Wendl. (Oliver 1977). Salter (1950) mentions the following hybrids occurring between some 28 species of *Erica* on the Cape Peninsula, one of which is described and documented as *E.* × *fontensis* Salter (Salter 1935):

E. fontana Salter × *E. capensis* Salter
E. fontana Salter × *E. laeta* Bartl.
E. eburnea Salter × *E. laeta* Bartl.
E. capensis Salter × *E. laeta* Bartl.
E. heleogena Salter × *E. laeta* Bartl.
E. hirtiflora Curt. × *E. heleogena* Salter
E. hirtiflora Curt. × *E. mauritanica* L.
E. hirtiflora Curt. × *E. pyxidiflora* Salisb.
E. mauritanica L. × *E. baccans* L.
E. phylicifolia Salisb. × *E. nudiflora* L.
E. curvirostris Salisb. × *E. nudiflora* L.
E. pulchella Houtt. × *E. nudiflora* L.
E. lutea Berg. × *E. corifolia* L.
E. gnaphaloides L. × *E. palliiflora* Salisb.

Specimens examined:

Erica fastigiata

CAPE PROVINCE.—3418: Kogelberg (–BB), *Compton 16454* (NBG; STE); Buffelskloof (–BD), *Barker 8033* (NBG; STE); Platberg (–BD), *Boucher 183* (STE); *877* (STE); *2653* (STE); road to Platbos (–BB), *Haynes 696* (STE); Wynand Louwsbos (–BD), *Lamb 124* (STE); Buffelstalberg (–BD), *Oliver sub STE 30052* (STE); neck NW of Platberg towards Buffelstalberg (–BD), *Oliver 8609* (STE); Platbos (–BD), *Stehle 254* (STE); Platberg (–BD), *Thompson 495* (STE).

Erica fervida

CAPE PROVINCE.—3418: Kogelberg Reserve, neck NW of Platberg towards Buffelstalberg (–BD), *Oliver 8610* (BM; E; K; MO; P; PRE; S; STE).

Erica × *vinacea*

CAPE PROVINCE.—3418: Kogelberg Reserve, neck NW of Platberg towards Buffelstalberg (–BD), *Oliver 8611* (BM; E; K; MO; P; PRE; S; STE); between Platteberg and Kogelberg (–BB/BD), *Stokoe sub BOL 17599* (BOL, holo.).

UITTREKSEL

Die herontdekking van Erica vinacea *L. Bol. in simpatriese populasies van twee ander soorte het aanleiding gegee tot 'n vergelyking van hul morfologiese eienskappe. Die resultate van die ondersoek dui op 'n vermeende hibridiese oorsprong*: E. × vinacea *L. Bol.* = E. fastigiata *L.* × E. fervida *L. Bol.*

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Bothalia 16,1: 39–64 (1986)

Notes on African plants

VARIOUS AUTHORS

ACANTHACEAE

NOTES ON SOUTHERN AFRICAN SPECIES OF *JUSTICIA* L.

As the result of a revision of *Justicia* L. in southern Africa, to be published in the *Flora of southern Africa (FSA)*, the number of species represented in the area has been reduced from 30–40 [Dyer, R. A., *Genera* 1: 598 (1975)] to 22 with six subspecies. One species and one subspecies are new and are here described. A list of name changes of the species in the area is given, with an abridged synonomy containing only basionyms and names until recently considered to be those of distinct species. A full synonomy will be given in the *FSA*. Changes in rank are also given.

Justicia parvibracteata *Immelman,* sp. nov., *J. protractae* (Nees) T. Anders. subsp. *rhodesianae* (S. Moore) Immelman affinis, sed planta minor, bracteis reductis, triangularibus differt.

Suffrutex vel herba perennis, 0,12–0,5 m alta, omnino subtiliter et dense puberula. *Folia* 4–25 × 1–10 mm, anguste vel late lanceolata, apice late acuto vel obtuso, basi cuneata, margine interdum glanduloso, petioli graciles, 0–6 mm longi. *Inflorescentia* 1 (–2) floribus in cyma. *Bractea bracteolaeque* reductae, subulatae vel triangulares, c. 2 × 1 mm. *Calyx* lobis 5, subaequalibus, anguste lanceolatis. *Corolla* (tubus et labium superum) (4–) 5–8 mm longa, alba, lineis testaceis in palato. *Capsula* quadriseminalis, usque ad 8 mm longa, delicatula, subtiliter puberula. *Pollen* bicolporatum, sexinio fasciato.

TYPE.—Cape Province, 2722 (Olifantshoek): in Toto Mountains, kloof, in rock crevices and under shrubs (–DD), *Tölken & Schlieben 1176* (PRE, holo.!).

Shrublet or perennial herb, 0,12–0,5 m high, all parts minutely and densely puberulous. *Leaves* 4–25 × 1–10 mm, sometimes glandular on margins, narrowly to broadly lanceolate, apex broadly acute to obtuse, base cuneate; petiole slender, 0–6 mm long. *Inflorescence* of 1 (–2) flowers per cyme, sessile, scattered in leaf axils. *Bract and bracteoles* reduced, subulate to triangular, c. 2 × 1 mm. *Calyx* of 5 subequal, narrowly lanceolate lobes. Corolla (tube and upper lip) (4) 5–8 mm long, white with dark red lines on palate. *Capsule* 4-seeded, cylindrical, with a stipe, puberulous, delicate, up to 8 mm long. *Pollen* 2-colporate, with sexine in areoles on either side of the colpus.

Endemic to the Northern Cape, where *J. protracta* does not occur.

Justicia orchioides *L.f.* subsp. **glabrata** *Immelman,* subsp. nov. a subspecie typica omnibus partibus sine pilis longis rectis albo-opacis differt.

Fruticulus lignosus, 0,14–0,6 m altus; caules crassi, nodosi, interdum spinescentes, partes omnes glabratae vel pilis brevibus vel papillis crassis pyramidalibus, sine pilis candidis ut in subsp. *orchioide;* cortex cinereus, rimosus sulcatus; rami juvenes subherbacei. *Folia* ovata vel lanceolata, sessilia, 3,5–13 × 1,5–7 mm, apice obtusa vel acuta, basi cuneata, coriacea; costa prominens sed nervi laterales obscuri. *Inflorescentia* cymarum remotarum, unaquaeque ad florem solitarium pedunculatum axillarem reducta. *Pedunculi et pedicelli* validi, 1–10 mm longi. *Bractea* nulla. *Bracteolae* duae, triangulares, 1–2 mm longae, basi pedunculum transverse junctae. *Corolla* (tubus et labium superum) 7–10 mm longa, lactea striis testaceis palato. *Capsula* uniseminalis, glabrata, dura, usque ad 17 mm longa. *Pollen* bicolporatum, sexinium fasciatum.

TYPE.—Cape Province, 3326 (Grahamstown): between Piggots Bridge and Hounslow, 400 m, roadside on dry clay soil (–AB), *A. Jacot Guillarmod 6902* (PRE, holo.!; GRA!).

Woody shrublet, 0,14–0,6 m high; stems thick, gnarled, may become spiny; all parts glabrous or with short hairs or with stout pyramidal papillae, without white-opaque hairs as in subsp. *orchioides;* bark grey, cracked and furrowed; young branches subherbaceous. *Leaves* ovate to lanceolate, sessile, 3,5–13 × 1,5–7 mm, apex obtuse to acute, base cuneate, leathery; midrib prominent but side veins not visible. *Inflorescence* of scattered cymes, each reduced to a single pedunculate flower. *Peduncles and pedicels* stout, 1–10 mm long. *Bract* absent. *Bracteoles* 2, triangular, 1–2 mm long, joined at base across peduncle. *Corolla* (tube and upper lip) 7–10 mm long, cream with red striping on palate. *Capsule* 1-seeded, glabrous, hard, up to 17 mm long. *Pollen* 2-colporate, sexine banded on either side of the colpi.

Very like the typical subspecies except for the lack of the characteristic long stiff white-opaque hairs. The typical subspecies is furthermore confined to the area around Port Elizabeth, whereas subsp. *glabrata* is widespread in the eastern half of the Karoo and the southern Cape.

The type of subsp. *orchioides* is a Thunberg specimen at UPS. Although I have seen it only on a microfiche, which does not show fine detail, and do not know precisely where it was collected, information on the hairs received from UPS indicates that at least the right hand plant on the sheet belongs with the Port Elizabeth subspecies. I have therefore provided a name and a description for the more widespread subspecies for which no existing name was found.

J. orchioides and *J. cuneata* have often been confused, both in the literature and in herbaria, and the

characters used to distinguish them in the *Flora Capensis* key are not reliable. The two species are nevertheless quite distinct, with *J. cuneata* having hooded flowers longer than 10 mm and the sexine of the pollen areolate, while in *J. orchioides* the flowers are 10 mm or shorter, not hooded, and the sexine of the pollen forms a raised band along the smooth area on either side of each colpus.

Justicia betonica *L.*, Sp. Pl. 15 (1753). Type: Ceylon [Sri Lanka], *Hermann* vol. 3, fol. 2 (BM; photo at PRE!).

J. trinervia Vahl, Enum. 1: 156 (1804). Type: E India, *Röttler s.n.* (C).

Adhatoda variegata var. *pallidior* Nees in DC., Prodr. 11: 385 (1847). *Justicia pallidior* (Nees) C.B. Cl. in Fl. Cap. 5,1: 58 (1912). Type: Transvaal, Apies River, *Burke 514* (K!).

A. cheiranthifolia Nees in DC., Prodr. 11: 387 (1847). *Justicia cheiranthifolia* (Nees) C.B. Cl. in Fl. Cap. 5,1: 58 (1912). Type: Transvaal, Magaliesberg, *Burke s.n.* (K!).

Justicia betonicoides C.B. Cl. in Fl. Trop. Afr. 5: 184 (1900), in Fl. Cap. 5,1: 58 (1912). Syntypes: Sudan, Jur, Jur Ghattas, *Schweinfurth 1423;* Gabon, Bongo, *Schweinfurth 2543;* French Equatorial Africa, Mittu (Mittou), *Schweinfurth 2793;* Kenya, along Gilgil River, north of Lake Naivashu, 6–7000 ft, *Scott-Elliot 6647;* Tanzania, Tanganyika Plateau, at Fort Hill, 3500–4000 ft, *Whyte s.n.*

Justicia petiolaris *(Nees) T. Anders.* in J. Linn. Soc., Bot. 7: 39 (1864). *Adhatoda petiolaris* Nees in DC., Prodr. 11: 402 (1847). Syntypes: Natal, Umzimvubu River, wooded rocky shaded valley and ravine by river, below 1000 ft, *Drège s.n.* (K!; P!); Natal, Umgeni, on hills, 200 ft, *Drège s.n.* (P!).

(a). subsp. **petiolaris.**

(b). subsp. **bowiei** *(C. B. Cl.) Immelman,* stat. nov.

J. bowiei C.B. Cl. in Fl. Cap. 5,1: 59 (1912). Syntypes: Cape Province, near Kei Mouth, in woods, 300 ft, *Flanagan 882* (BOL!; GRA!; PRE; SAM!); Cape Province, moist situations in George, Uitenhage and Albany Divisions, *Bowie s.n.* (K!); no locality, *Guthrie 4711* (BOL!).

J. mutica C.B. Cl. in Fl. Cap. 5,1: 61 (1912). Type: Cape Province, wooded situations in Uitenhage and Albany Districts, *Bowie s.n.* (K!).

(c). subsp. **incerta** *(C.B. Cl.) Immelman,* stat. nov.

J. incerta C.B. Cl. in Fl. Cap. 5,1: 66 (1912). Type: Transvaal, bushveld between Elandsrivier and Klippan, *Rehmann 5058.*

The distribution of the subspecies is unusual: it is found in N Natal and in the Nylstroom-Thabazimbi-Rustenburg area, with a single record from the central Kruger National Park.

Justicia protracta *(Nees) T. Anders.* in J. Linn. Soc., Bot. 7: 41 (1864). Syntypes: Cape Province, between shrubs in field by Zwartkops River, *Ecklon 456* (BOL!; MEL!); Cape Province, Bosmans River Mountains, *Ecklon s.n.*; near Grahamstown, *Ecklon s.n.* (S!); between Great Fish River and Ceded Territory, *Ecklon s.n.* (PRE!; S!).

Gendarussa protracta Nees in Linnaea 15: 371 (1841), partim excl. syn. Thunb.

(a). subsp. **protracta.**

J. kraussii C.B. Cl. in Fl. Cap. 5,1: 62 (1912). Syntypes: Natal, between Mlazi River and Durban Bay, *Krauss 61* (BM!; K!); Natal, Inanda, *Wood 423;* Natal, Zululand, *Gerrard 1272* (BM!; K!).

J. kraussii var. *florida* C.B. Cl. in Fl. Cap. 5,1: 62 (1912). Type: Natal, Inanda, *Wood 566* (BM!).

J. pulegioides C.B. Cl. in Fl. Cap. 5,1: 62 (1912) partim excl. syn. *Chaetacanthus persooni* Nees. Syntypes: Cape Province, Uitenhage, *Ecklon & Zeyher 436*; Cape, Komadagga, *Burchell 3300* (G–DC!); Cape Province, Komgha, *Flanagan 725* (NH!; GRA!; PRE!; SAM!); Natal, Durban Flats, *Wood* in *Herb. Norm. Aust.-Afr. 1019* (BOL!; PRE!; SAM!); Natal, Inanda, *Wood 718* (PRE!; NH!), *Wood 309*; Natal, Durban Bay, *Krauss 304*; Natal, Pondoland, between St Johns River and Umsikaba River, *Drège s.n.*; Transvaal, Houtbosch Rand, *Schlechter 3324*; without localities, *Peddie s.n., Sanderson 433, Grant s.n.*

J. woodii C.B. Cl. in Fl. Cap. 5,1: 64 (1912). Type: Natal, Noodsberg, *Wood 112* (K!).

Probably the most common of the southern African species, *J. protracta* subsp. *protracta* is found in the eastern half of the country as far south as Port Elizabeth. In the northern Transvaal as well as in SWA/Namibia and Botswana it is largely replaced by subsp. *rhodesiana,* though the transition is gradual. The great range in pubescence and leaf size and shape has led to the description of numerous species and subspecies, but examination of a larger number of specimens shows that these form a continuous range rather than discrete entities.

(b). subsp. **rhodesiana** *(S. Moore) Immelman,* stat. nov.

J. rhodesiana S. Moore in J. Bot., Lond. 51: 188 (1913). Syntypes: Botswana, Mahalapye, *Rogers 6069* (BOL!; SAM); Zimbabwe, Bulawayo, *Rogers 5740* (BOL!; SAM!).

Differs from the typical subspecies in having all parts puberulous rather than pilose. The distribution is also more northerly, as it occurs in SWA/Namibia, Botswana and the northern Transvaal, while subsp. *protracta* is found in the southern and eastern Transvaal, Natal and the eastern Cape. The transition, however, is not an abrupt one.

Justicia cuneata *Vahl,* Symb. bot. 2: 10 (1790–94), Enum. 1: 163 (1804). Type: Cap. bon. spei (Cape of Good Hope), *Sparrman s.n.* in herb. Dahl (C!).

(a). subsp. **cuneata.**

(b). subsp. **latifolia** *(Nees) Immelman,* comb. et stat. nov.

Gendarussa orchioides var. *latifolia* Nees in Linnaea 15: 369 (1841). Type: Cape Province, Kanaquasberg, *Ecklon s.n.* (BOL!); Cape, Clanwilliam, between Olifantsrivier and Brakfontein, *Ecklon & Zeyher s.n.* (S!; MEL!).

(c). subsp. **hoerleiniana** *(P. G. Mey.) Immelman,* stat. nov.

J. hoerleiniana P. G. Mey. in Mitt. bot. StSamml., Münch. 2: 300 (1957). Type: SWA/Namibia, Alicetal, Pomona (probably on the coastal plain in the Lüderitz District), *Dinter 6401* (BOL!; PRE!).

For the differences between *J. cuneata* and *J. orchioides,* see under *J. orchioides* (above).

Subsp. *cuneata* occurs only around Port Elizabeth, and is glabrous, while subsp. *latifolia* is relatively widespread in Namaqualand and the western half of the Karoo, with one record from Port Elizabeth, and is densely and minutely puberulous on leaves and calyx. Subsp. *hoerleiniana* is confined to a small area on the southern coast of SWA/Namibia, and is also

puberulous, but the hairs have very swollen, anvil-shaped heads instead of being pointed as in subsp. *latifolia*.

Justicia matammensis *(Schweinf.) Oliv.* in Trans. Linn. Soc. Lond. 29: 130 (1875). Type: E Sudan, Gallabat, Matamma (Metemma), *Schweinfurth 130c* (K!).

Adhatoda matammensis Schweinf. in Verh. zool.-bot. Ges. Wien. 18: 674 (1868).

J. exigua S. Moore in J. Bot., Lond. 38: 204 (1900). Type: Zimbabwe, Bulawayo, *Rand 389* (BM!).

Species insufficiently known or excluded

Justicia brycei C.B. Cl. in Fl. Cap. 5,1: 67 (1912). Type: Lesotho, near the summit of Machacha, 10,000 ft, *Bryce s.n.* (K!). The specimen belongs to **J. elegantula** *S. Moore*, but this species does not occur further south than Zimbabwe. Also, no southern African species is known to grow at such high altitudes. Probably, as Jacot Guillarmod suggests in her *Flora of Lesotho*, the locality on the specimen is incorrect, and should possibly be Macheke, Rhodesia (Zimbabwe).

Rhytiglossa rubicunda Hochst. in Flora (1845): 71 (1845); C.B. Cl. in Fl. Cap. 5,1: 67 (1912). Type: Cape Province, Tsitsikamma Forest, *Krauss 1128* (K!). Placed tentatively in *Justicia* under 'species insufficiently known', but without formal transfer, by C.B. Clarke. Type not found, nor does the description fit any *Justicia* species known from near that area.

Justicia pulegioides subsp. *late-ovata* C.B. Cl. in Fl. Cap. 5,1: 62 (1912). Type: Cape Province, on the rocks of Zwartwater Poort, *Burchell 3405* (K!), *3364* (K!). The specimens belong to **Siphonoglossa tubulosa** (Nees) Benth. ex Lindau.

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K. IMMELMAN

ADIANTACEAE

CHEILANTHES DELTOIDEA KUNZE IN THE WATERBERG, TRANSVAAL

In March 1980 N. H. G. Jacobsen discovered a tiny, bright green, gregarious fern in cracks and shallow humus pockets on north-facing cliffs on the farm Leeuwpoort 573 KR, about 20 km north-west of Nylstroom, Grid no. 2428: (–CB) (Fig. 1). Samples were at first thought to be a dwarf form of *Cheilanthes viridis* (Forssk.) Swartz var. *viridis*, but the different rhizome scales and filiform stipes raised doubts. Material secured and examined during two visits to the site is mounted on sheet numbers *N. Jacobsen 5209* and *W. Jacobsen 5500*, at the National Herbarium, Pretoria (PRE).

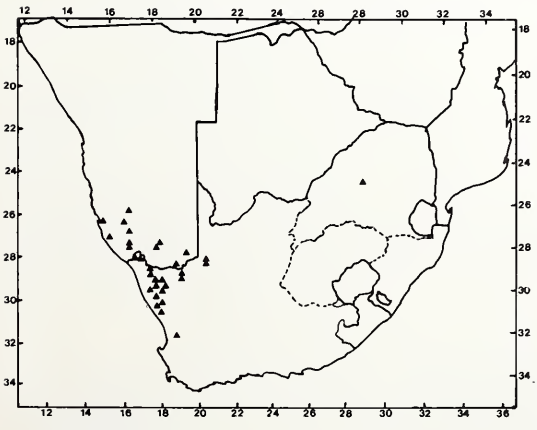

FIG. 1. — Distribution of *Cheilanthes deltoidea*.

The plants grew on very roughly hollowed out cliffs on a highly ferruginous vesicular lava of the Waterberg System, obviously representing the iron-rich scoria of an andesitic lava flow. Such scoriae are usually locally limited. The total length of outcrop was about 200 m. The vegetation both at the foot and top of the cliffs consisted of grasses and herbs with tufts of *Cheilanthes viridis* var. *glauca* (Sim) Schelpe & N. C. Anthony in sheltered position and frequent, elongate and rather contracted plants of *Cheilanthes hirta* Swartz, especially on top of the cliffs. Occasional small shrubs of *Diospyros lycioides* Desf. and *Ziziphus mucronata* Willd. grew along the ridge.

On the whole the characteristics of the fern from the Waterberg agree with those of *Cheilanthes deltoidea* Kunze, a species known so far only from the arid and semi-arid regions of Namaqualand and southern SWA/Namibia. The rhachis is somewhat atypical as it is not always winged with green laminar tissue above the basal pinnae (N. C. Anthony 1984: 110). Also slightly deviating are the occasional forking of the stipe about halfway up, allowing the development of two laminae on one common stipe, and the more widely spaced and narrower triangular pinnules of the lowest pinnae, the latter resembling Sim's var. *laxa* of the species (Sim 1915, Pl. 105). Spores of *Jacobsen 5209*, however, were found to match those of typical *C. deltoidea* (N. C. Anthony pers. comm.).

The occurrence of this species outside its previously recognized distribution range suggested vari-

ous possibilities. Spore dispersion from Namaqualand or southern SWA/Namibia could possibly account for the apparently completely isolated presence in the Transvaal (Fig. 2).

In view of the harsh climatic conditions (north face, hot position on bare cliffs) of the Transvaal site it appears to be more likely that this population is a relict from a former, much drier period. Similar recently discovered occurrences in the Transvaal of some species thought so far to be confined to the western Cape or to SWA/Namibia, such as *Cheilanthes parviloba* Swartz and *C. marlothii* (Hieron.) Schelpe (W. B. G. Jacobsen 1983; N. C. Anthony 1984) or *C. contracta* (Kunze) Mett. ex Kuhn (N. C. Anthony 1984) support this hypothesis.

ACKNOWLEDGEMENTS

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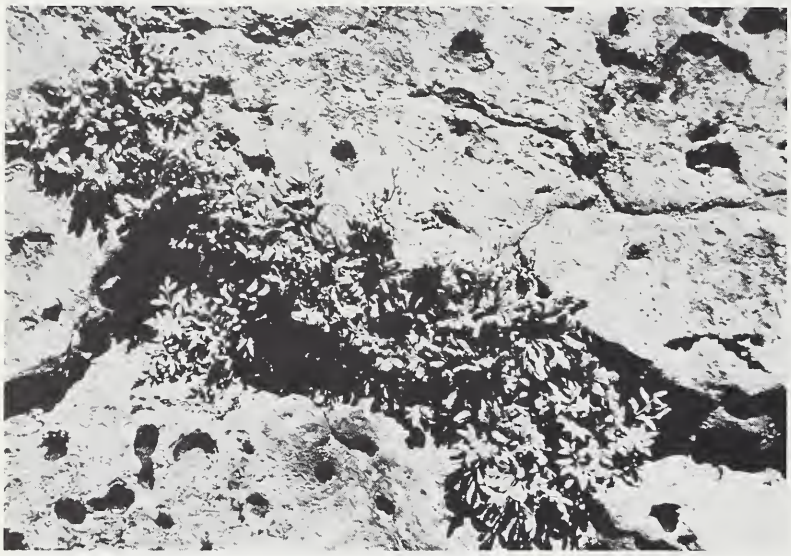

FIG. 2. — *Cheilanthes deltoidea in situ.*

BRYACEAE (MUSCI)

A NEW SPECIES OF *ANOMOBRYUM*

Anomobryum drakensbergense *Van Rooy*, sp. nov., *A. sharpii* A.J. Shaw similis, sed costa percurrenti, capsula pyriformi breviori et endostomio segmentis late perforatis differt. Plantae caespitosae foliis imbricatis, costa percurrenti; laminae cellulis superioribus brevi-rhomboidalibus vel lineari-rhomboidalibus interdum vermicularibus, endostomium ciliis rudimentalibus.

TYPE.—Natal, 2929 (Underberg): Organ Pipes Pass (–AA), 7000–8000 ft., *Esterhuysen 34594* (PRE, holo.; MO; BOL).

Plants small to medium-sized, caespitose, yellowish green to brownish above, yellow-brown to brown below; saxicolous to terricolous. *Stems* to 20 mm tall, branching by forks or subperichaetial innovations, occasionally tomentose below, yellowish green or reddish brown to brown; in section round, central strand of thin-walled cells present, inner cortical cells in 2–4 rows, thin-walled, outer cortical cells in 1–2 rows, thin-walled to incrassate. *Leaves* ± equidistant, about equal in size or subperichaetial leaves larger, imbricate, frequently concave, erect when dry, erect-spreading when wet, shortly oblong-acute or ovate to ovate-lanceolate, (0,5–) 0,6–1,3 mm long; apex acute; margins plane or rarely recurved, entire; border absent. *Costa* percurrent or occasionally mucronate, generally yellow, frequently reddish below; in section subround to round, lamina inserted ventrally, ventral surface

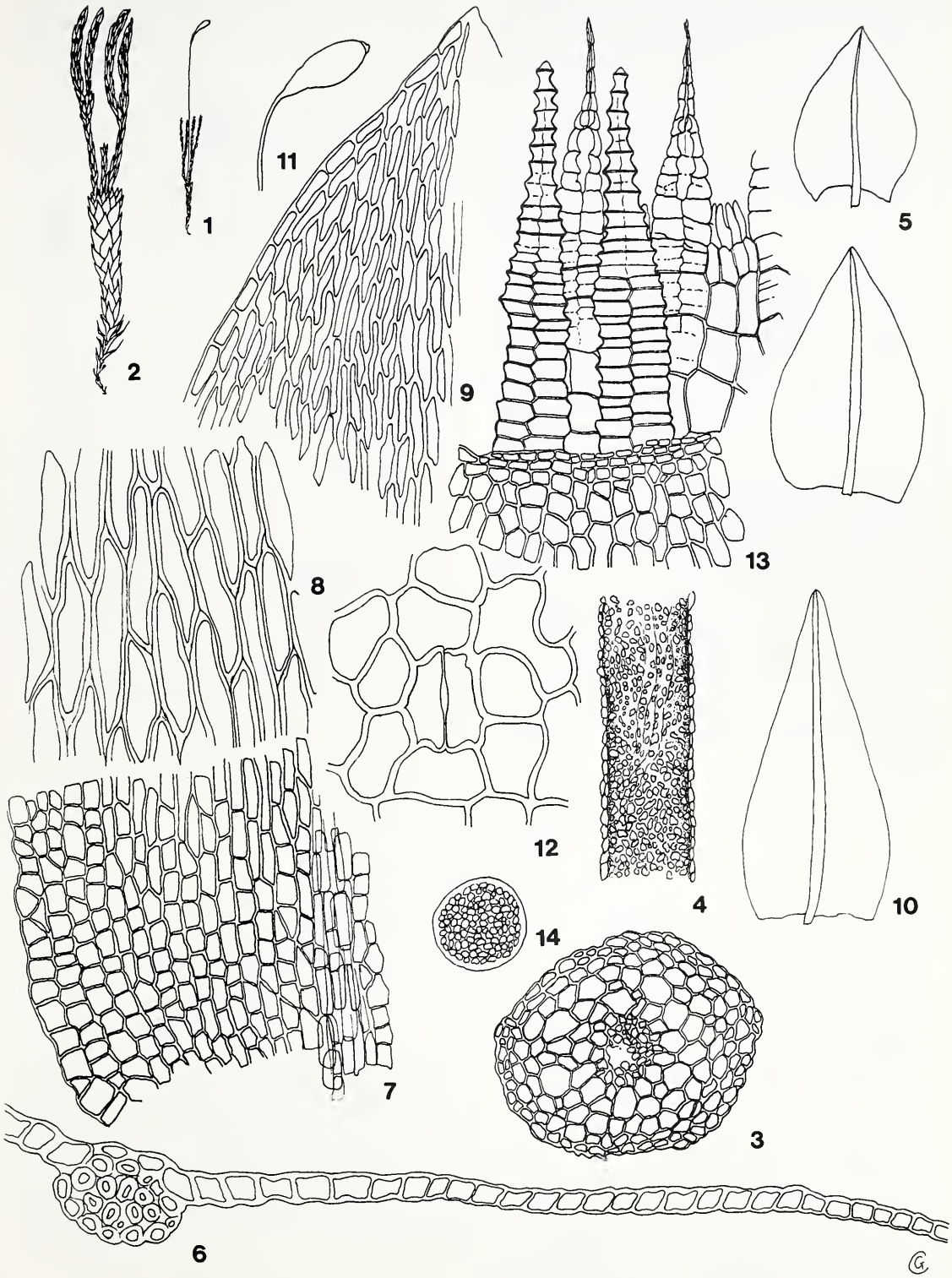

FIG. 3. — *Anomobryum drakensbergense*: 1, habit, × 2; 2, habit, × 5; 3, stem in cross section, × 175; 4, rhizoid, × 350; 5, leaves, × 35; 6, part of leaf in cross section, × 350; 7, basal leaf cells, (left side), × 175; 8, upper laminal cells, × 350; 9, leaf apex showing upper laminal cells, × 175; 10, perichaetial leaf, × 35; 11, capsule, × 5; 12, portion of capsule base showing stomatal apparatus, × 350; 13, part of capsule mouth showing cells and peristome, × 175; 14, spore, × 700. (1, 4, 6, 11 – 14, *Esterhuysen 34594*; 2, 7, 10, *Smook 1095*; 3, 5, *Van Rooy 21*; 8, 9, *Smook 1096a*).

cells present, dorsal stereid band strong, dorsal surface cells incrassate, guide cells incrassate. *Upper laminal cells* short-rhomboidal to linear-rhomboidal, occasionally vermicular, frequently incrassate, (25–) 35–63 (–85)×7–19 µm; basal laminal cells frequently reddish, quadrate.

Dioicous. Perichaetia terminal but quickly overgrown by innovations; leaves ovate-lanceolate to lanceolate, 1–1,5 mm long, apex acute to acuminate, margins frequently recurved, costa percurrent to mucronate, upper laminal cells vermicular, basal laminal cells quadrate to rectangular. *Seta* 10–16 mm long, yellowish red or reddish brown; capsule pyriform, inclined to horizontal, yellowish to reddish or brown, frequently contracted below mouth when dry, urn 1–1,5 mm long, neck 0,8–1,5mm long, wrinkled when dry; exothecial cells irregularly rectangular to quadrate, incrassate, smaller at mouth; stomata present on neck, phaneropore; annulus present; peristome teeth narrowly oblong-acuminate, frequently irregular in outline, 220–300 µm long, bordered, trabeculate, yellowish to reddish, frequently hyaline above, minutely papillose; endostome segments broad below, tapering above, keeled, broadly perforated, yellowish to hyaline, cilia rudimentary, basal membrane high, yellow, minutely papillose; operculum conic, blunt to mucronate; calyptra cucullate; spores round, 12–18 µm, granulose. Fig. 3.

The species is known from the Drakensberg of Natal and Lesotho. It is found on soil in rock crevices in the Subalpine and Alpine Belts, from 2 100–3 050 m.

NATAL.—2828 (Bethlehem): on rocks below cliffs at Sentinel (–DB), *Smook 1095, 1096a* (PRE; MO). 2929 (Underberg): Giant's Castle Game Reserve, on the escarpment at the Judge Pass (–AB), *Van Rooy 21* (PRE; MO; H).

LESOTHO.—2828 (Bethlehem): Oxbow, on cliff above road 8 km west of Lodge (–DC), *Magill 4604* (PRE). 3028 (Matatiele): 15 km west of Ongeluksnek, cliffs above Lake Letsie (–AC), *Magill 4705* (PRE).

The slender plants, branching pattern of the stem, imbricate, erect leaves, leaf shape and areolation indicate the gametophytic relationship to other species of *Anomobryum*. The upper laminal cells are variable in shape, size and degree of cell wall thickening. Stem and innovation leaves have short-rhomboidal to rhomboidal or occasionally vermicular cells with thickened walls. Subperichaetial and perichaetial leaves have linear-rhomboidal to linear-vermicular cells with incrassate walls.

Sporophytically the peristome structure of this species falls within the infrageneric variation in peristome development. Both exostome and endostome show signs of reduction. Some exostome teeth are relatively short, blunt and irregular in outline and the endostome cilia are rudimentary.

A. drakensbergense is related to the Mexican *A. sharpii* A.J. Shaw but differs in the percurrent costa, shorter pyriform capsule and the broadly perforated endostome segments. *A. filiforme* (Dicks.) Solms, the other species occurring in southern Africa, has taller, julaceous and glossy stems, longer, narrower and strongly incrassate upper laminal cells, costae ending below the leaf apices and well developed peristomes.

The specific epithet *drakensbergense* refers to the Drakensberg mountains of Natal and eastern Lesotho where this species occurs.

J. VAN ROOY

COMBRETACEAE

A NEW SPECIES OF *COMBRETUM* FROM THE TRANSVAAL

Combretum petrophilum *Retief*, sp. nov., *C. apiculato* Sond. subsp. *apiculato* affinis, sed petalis non ciliatis et lamine anguste ovate differt.

TYPE.—Transvaal, 2430 (Pilgrim's Rest): Strÿdom Tunnel (–BC), *Carr 203* (PRE, holo.; K).

A shrub or small slender tree, up to 4 m high; deciduous; bark ± smooth, longitudinally reticulate, grey. *Stems* with few or no lateral branching for c. 1–1,5 m above ground; young twigs dull reddish brown. *Leaves* opposite, petiolate; lamina narrowly ovate to elliptic, occasionally broadly ovate to ovate, (14) 36–60(75)×(10)15–23 mm, discolorous, base asymmetrical, rounded, apex acute, obtuse or rounded, apiculate, often twisted, both surfaces sparsely to densely lepidote, sometimes with trichomes along margin and main vein, principal lateral veins alternate or opposite, in 5–7 pairs, main vein and reticulate tertiary veining of under surface prominent, margin smooth, occasionally undulate; petioles (2)5–8mm long, lepidote, trichomes sometimes present. *Inflorescence* an axillary spike; peduncles 11–16 mm long, rachis (3)8–11 mm long, glutinous and lepidote; bracts caducous. *Flowers* 4–merous. *Receptacle* glutinous and lepidote; lower receptacle c. 1,5 mm long, cylindrical, upper receptacle c. 1,5 mm long, campanulate. *Sepals* yellow, c. 1 mm long, lobes broadly triangular with a few trichomes at apices of lobes. *Petals* obtriangular, shortly unguiculate, margins not ciliate, c. 1×1,5 mm, dull yellow. *Stamens* 8, 1-seriate; filaments 5,5–6 mm long; anthers c. 1 mm long. *Disk* free for c. 0,5 mm, purplish pink, outer part pilose. *Style* 5 mm long. *Fruit* a 4–winged samara; subglobose, 16–18×10–15 mm; apical peg 0,5–1 mm long; stipe 3–4 mm long; glabrous but lepidote; light reddish brown when mature. *Cotyledons* 2, epigeal. *Scales* circular in outline, c. 55–75 mm in diameter delimited by 8 primary radial walls and 6–8 tangential walls. Fig. 4.

TRANSVAAL.—2429 (Zebediela): 12,8 km from Malipsdrif to Ganspoort (–BB), *Van Wyk 5243* (PRE; PRU). 2430 (Pilgrim's Rest): Strÿdom Tunnel (–BC), *Van der Schijff 7318* (PRE); Abel Erasmus Pass (–BC), *Strey 3454* (K; MO; PRE); Swadini National hiking trail (–BD), *Van Greuning 513* (PRE; PRU); Ma-

riepskop picnic spot (–DB), *Van der Schijff 6094* (PRE; PRU). 2529 (Witbank): Fonteinsonderend, Loskop Dam (–AD), *Theron 2171* (PRE; PRU); Doornkop (–CB), *Du Plessis 422* (PRE; PRU).

FIG. 4. — *Combretum petrophilum*. 1, branch with leaves and inflorescences, × 0,8; 2, flower, × 3 (*Strey 3454*).

Combretum petrophilum is endemic to the Transvaal. The species usually occurs on north-western or southern slopes in sourish mixed bushveld. Specimens of the species are found growing between rocks, in fissures or along ledges. The specific epithet refers to the habitat preference of the species.

C. petrophilum is placed in the section *Ciliatipetala* Engl. & Diels even though [as in the case of *C. psidioides* Welw. subsp. *glabrum* Exell (1978), which was also placed there] its petals are not ciliate at the apex. All other characteristics of the new species are typical of the section *Ciliatipetala*.

C. petrophilum is similar to *C. apiculatum* subsp. *apiculatum*. Apart from its petals being without cilia at the apex it differs mainly in its leaf lamina which is ovate to elliptic rather than broadly to narrowly obovate-elliptic. The main and secondary veins of the new species are also much less prominently raised and not markedly yellow and the flowers are arranged in laxer spikes than in *C. apiculatum* subsp. *apiculatum*.

The first record of *C. petrophilum* was from the Abel Erasmus Pass, where Mr R. G. Strey collected some fruiting material in March 1960. In November of the same year he went back and collected flowering specimens. Exell examined the material in 1967 and tentatively identified the taxon as a form of *C. apiculatum*.

REFERENCE

EXELL, A.W. 1978. Combretaceae. *Fl. Zambesiaca* 4: 100–183.

E. RETIEF

CYPERACEAE

CYPERACEAE NEW TO THE FLORA OF NATAL

During March 1985 a collecting trip to the Muzi Swamps in the Ingwavuma District of KwaZulu was undertaken. The following additions to Ross's *Flora of Natal* (1972) were collected:

1. *Cyperus cuspidatus* Kunth: *Reid 1025.*
Annual, previously known from South West Africa/Namibia, Botswana and Transvaal, also Tropical Africa. *Rodin 4539* (PRE!), collected at Stegi (Siteki), Swaziland, is also this species.

2. *Cyperus tenuispica* Steud.: *Reid 1057.*
Annual, previously known from South West Africa/Namibia, Botswana and Transvaal, also Old World Tropics.

3. *Eleocharis atropurpurea* (Retz.) Presl : *Reid 1053.*
Annual, previously known from South West Africa/Namibia, Botswana and Transvaal, also worldwide. *Hitchins 827* (PRE!) from Hluhluwe Game Reserve is also this species.

4. *Hemicarpha micrantha* (Vahl) Pax : *Reid 1026.*
Podlech in *Prodr. FSWA* (1967) is followed in maintaining *Hemicarpha* Nees & Arn. separate from *Scirpus* L. s. str. and from *Lipocarpha* R. Br. Annual, previously known from South West Africa/Namibia and Transvaal, also Tropical Africa and throughout America.

5. *Mariscus paradoxus* (Cherm.) Cherm. : *Reid 1027.*
Annual, previously known from South West Africa/Namibia and Transvaal, also Mozambique and Madagascar.

6. *Pycreus atribulbus* (Kükenth.) Napper : *Reid 1029.*
Perennial, previously known from the coasts of Mozambique and Tanzania. One of the syntypes, *Schlechter 12254,* (PRE, iso.!), was collected at 25 Miles Station (Dondo), near Beira, Mozambique. The species is represented in PRE by a further two

collections from Natal : *Ward 2918* and *Ward 7731*, both from Hlabisa District. In the Muzi Swamps the species is locally dominant.

7. *Pycreus pumilis* (L.) Nees : *Reid 1034.* Hooper in *FWTA* edn 2 (1972) is followed in no longer upholding the var. *patens* (Vahl) Kükenth. Annual, previously known from South West Africa/Namibia, Botswana, Transvaal and Swaziland, also widespread in Old World Tropics and Central America. *Pentz & Acocks 10265* (PRE!) collected at Wessels Nek (Klip River District, Natal) is also this species.

During the course of routine herbarium work a further new record for the *Flora of Natal* was noted:

8. *Pycreus macrostachyos* (Lam.) J. Raynal. Previously known from South West Africa/Namibia, Botswana, Transvaal and Swaziland, also Tropical Africa. In PRE the following collections from Natal, which were previously misidentified, represent this species: *Tinley 603* from Mkuze Game Reserve, and *Ward 5574* from the vicinity of Ncemane Station, Hlabisa District.

C. REID

ERICACEAE

A NEW SPECIES OF *ERICINELLA* FROM THE SOUTHERN DRAKENSBERG

Ericinella hillburttii *E.G.H. Oliver,* sp. nov., Dracomontibus Capitis *Ericinellae multiflorae* Klotzsch Capite orientali affinis sed lobis corollae viridi-flavae cucullatis, staminibus inclusis, antheris terminalibus ovario insidentibus, filamentis brevibus apice latis aristis decurrentibus, foliis adaxiale praecipue basin versus pubescentibus.

Frutex erectus ad 1,5 m altus caulibus multis. *Rami* breve lanati glabrescentes, saepe sterigmatibus. *Folia* 3-nata appressa imbricata anguste ovata ad anguste elliptica ad oblonga 1–1,8 × 0,4–0,8 mm, abaxiale glabra, adaxiale pubescentia praecipue basin versus, juventute longe ciliata, caespite apicali demum strigulis; petiolo abaxiale puberulo juventute, saepe glabrescenti sed nonnullis pilis persistentibus. *Flores* 1–3(6)-nati extremis brachyblastorum lateralium coarctatorum; pedicello 1,5–1,7 mm longo puberulo viridi; bractea toto recaulescenti; bracteolis deficientibus. *Calyx* 4-lobatus viridis; lobo majore 0,7–0,8 mm longo, anguste triangulari, omnibus glabris ciliatis apice sulcatis. *Corolla* 4-lobata 1,2–1,8 × 1–1,3 mm late obovoidea, viridi–flava; lobis latis rotundatis partim cucullatis interdum emarginatis. *Stamina* 4 libera inclusa; filamentis 0,3–0,6 mm longis linearibus apice expansis glabris; antheris 0,5–1,1 mm longis ellipsoideis ad obovoideis ovario insidentibus glabris muticis ad distincte aristatis, aristis ad 0,2 mm longis partim decurrentibus; poro longitudine $\frac{1}{4}$–$\frac{1}{3}$ thecae partes aequanti. *Ovarium* 3-cellulare, 0,5–0,8 mm longum late ellipsoideum ad globosum longitudine porcatum in dimidio superiore, supra lanatum; stylo 0,6–0,9 mm longo glabro; stigmate infundibuliformi 0,4–0,7 mm diam. manifesto ad paulo exserto. *Fructus* capsularis 1,0–1,2 mm longus, sparse lanatus, septis base $\frac{1}{3}$–$\frac{1}{2}$ capsulae partes aequantibus; seminibus anguste ellipsoideis c. 0,75 × 0,42 mm testa reticulata cellularum elongatarum impressarum marginibus irregulariter undulatis. Fig. 5.

TYPE.—Cape, Elliott District, Baster-voetpad between Saamwerk and Mt Enterprise, 2 130 m, 16 November 1983, *Oliver 8151* (PRE, holo.; BM; BOL; E; GRA; K; MO; NBG; NU; NY; S; STE).

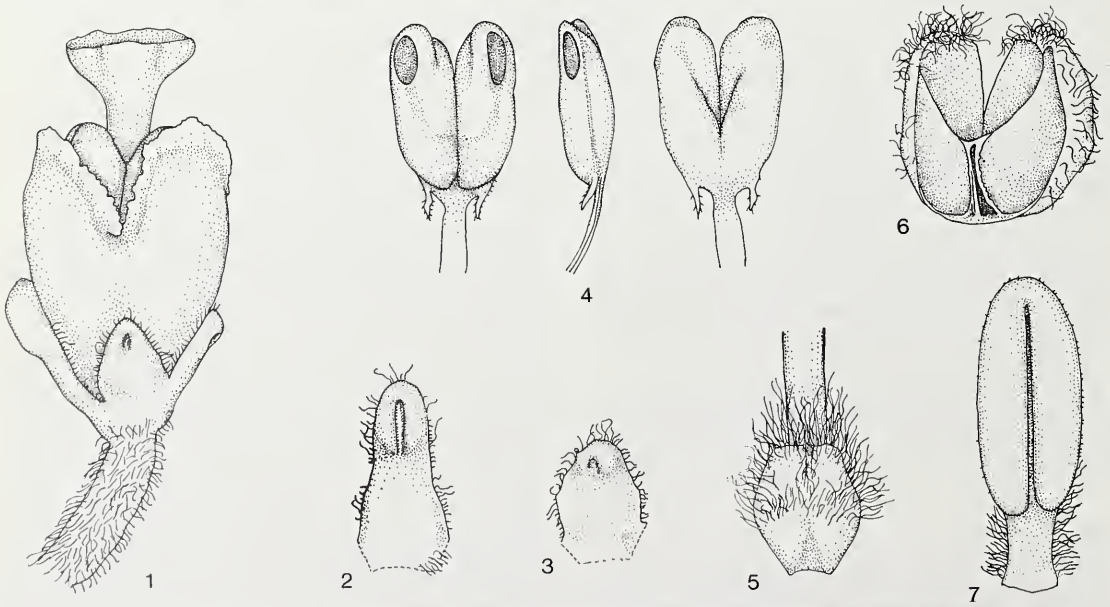

FIG. 5. — *Ericinella hillburttii*. 1, flower; 2, bract (as large lobe of calyx); 3, lateral sepal; 4, anther, front, side and back views; 5, ovary; 6, fruit with one valve removed; 7, leaf; all drawn × 25 from the holotype, *Oliver 8151* (STE).

Erect compact shrubs up to 1,5 m tall, many-stemmed from a woody rootstock. *Branches* shortly lanate soon becoming glabrous, often with distinct internodal sterigmata. *Leaves* 3-nate, appressed imbricate, narrowly ovate to narrowly elliptic to oblong, 1,0–1,8 × 0,4–0,8 mm, glabrous abaxially, pubescent adaxially mainly towards the base, long ciliate and pubescent all over when young and with an apical tuft which remains as strigulae; petiole puberulous abaxially when young, often glabrescent but with some long hairs remaining. *Flowers* 1–3(6)-nate on the ends of short lateral brachyblasts crowded at the ends of the branches; pedicel 1,5–1,7 mm long, puberulous, green; bract fully recaulescent; bracteoles wanting. *Calyx* 4-lobed, green; larger lobe 0,7–0,8 mm long, narrowly triangular to subspathulate from a broadened base; remaining lobes 0,6–0,8 mm long, more or less triangular; all lobes ciliate, the smaller ones pubescent on the inner surface, sulcate at the apex, the larger ones more so. *Corolla* 4-lobed, 1,2–1,8 × 1,0–1,3 mm, broadly obovoid, greenish yellow soon turning pale brown and papery; lobes broad, rounded, partially cucullate sometimes emarginate. *Stamens* 4, free, included; filaments 0,3–0,6 mm long, linear, expanded at the apex, glabrous, ¼–½ the length of the anther; anthers 0,5–1,1 mm long ellipsoid to obovoid, seated on top of the ovary, glabrous, muticous to distinctly aristate, awns up to 0,2 mm long, partially decurrent; pore ¼–⅓ the length of the thecae. *Ovary* 3-celled, 0,5–0,8 mm long, broadly ellipsoid to globose, ridged longitudinally in the upper half, lanate above and mainly down the ridges; style 0,6–0,9 mm long, glabrous; stigma infundibuliform, 0,4–0,7 mm in diam., manifest to slightly exserted. *Fruit* a dehiscent loculicidal capsule 1,0–1,2 mm long, sparsely lanate with well developed septa at the base ⅓–½ the length of the capsule; seeds narrowly ellipsoid, 0,75 × 0,42 mm with reticulate testa of elongate sunken cells with irregularly undulate margins.

This species was first collected by Prof. Olive Hilliard and Mr Bill Burtt as recently as February 1983 when only fruiting material was available. From this it was nevertheless possible to determine that the material represented a new species. During November 1983, I visited the locality of their collection to collect flowering material and to study the species in the field. En route, material of *Ericinella multiflora* Klotzsch, the only other species in the genus in the eastern Cape, was collected on the Katberg Pass. This made it possible to compare the two species in the fresh state. Fig. 6.

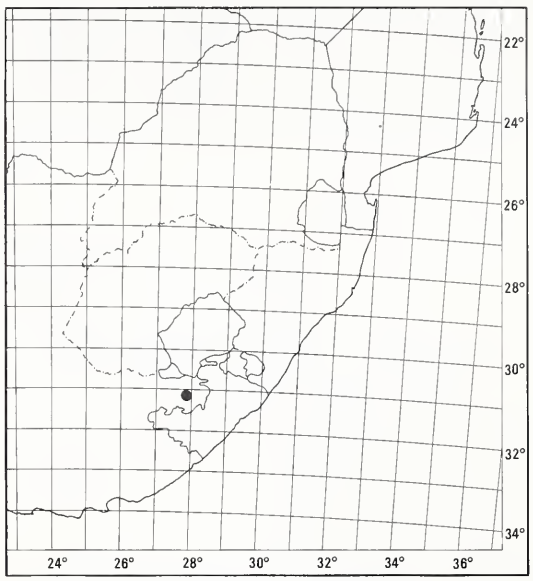

FIG. 6. — Distribution of *Ericinella hillburttii.*

E. hillburttii is allied to *E. multiflora,* but differs in a number of characteristics as set out in Table 1.

E. hillburttii is known to date only from the type locality, the Baster-voetpad in the mountains north-west of Elliott in the north-eastern Cape. Accessibility in these mountains is very poor, and other populations may well occur farther north towards Naude's Neck.

The plants were among the tallest in the vegetation, but because of the very dull colour and small size of the flowers were not very striking even when in full bloom. The above features, coupled with the larger stigma and lack of nectaries, suggest the wind pollination syndrome.

TABLE 1.—Comparison of characteristics of the allied species, *Ericinella hillburttii* and *E. multiflora*

E. hillburttii	*E. multiflora*
Multi-stemmed from woody rootstock	Single-stemmed
Distinct internodal sterigmata often present on branches	No distinct sterigmata
Leaves adaxially pubescent mainly near the base	Leaves adaxially evenly pubescent
Corolla pink, lobes slightly cucullate	Corolla greenish yellow, lobes erect to spreading
Filaments 0,3–0,6 mm long, expanded at apex	Filaments c. 1,4 mm long, linear
Anthers included, seated on ovary	Anthers exserted, placed well above ovary
Anthers terminally attached	Anthers dorsally attached near base
Awns partially decurrent	Awns free
Ovary lanate	Ovary pubescent
Seeds ellipsoid	Seeds broadly ellipsoid to subsphaerical

One striking feature of *E. hillburttii* is the large number of erect stems which arise from the basal woody rootstock. This is a sure indication that the plants regenerate quickly from the rootstock after a fire. This characteristic contrasts strongly with the single-stemmed habit found in its nearest relative, *E. multiflora*, and has probably evolved in response to the different habitat factors: *E. hillburtii* grows in shorter scrub vegetation on more open grassy slopes whereas *E. multiflora* grows on the edges of forest patches and in more sheltered woody scrub patches, only occasionally on open grassy slopes.

The plants of *E. hillburttii* occurred in a limited area on grassy rocky south-facing slopes with a surface layer of very loamy soil acting as a seep. At the high altitude of 2 100 m the plants have to tolerate very cold conditions during the winter months, often with a good covering of snow.

Specimen examined:

CAPE PROVINCE.— 3127(Lady Frere): Baster-voetpad (–BB), *Hilliard & Burtt 16662* (STE); ibid. *Oliver 8151* (see type).

E.G.H. OLIVER

FABACEAE

A FOURTH NATURAL *ERYTHRINA* HYBRID FROM SOUTH AFRICA

Krukoff and Barneby (1974) described two naturally occurring *Erythrina* hybrids from South Africa, *E.* × *coddii*, an intersubgeneric hybrid of *E. latissima* E. Mey. (subgenus *Chirocalyx*) and *E. lysistemon* Hutch. (subg. *Erythrina*), and *E.* × *hennessyae*, an intersectional hybrid of *E. lysistemon* (subg. *Erythrina* section *Caffrae*) and *E. humeana* Spreng. (subg. *Erythrina* sect. *Humeanae*).

Subsequently a third natural South African hybrid, *E.* × *johnsoniae* E.F. Franklin Hennessy, was described (Hennessy 1985) the parents of which are *E. latissima* subg. *Chirocalyx*) and *E. caffra* Thunb. (subg. *Erythrina*).

Neither fruit nor seeds have been obtained from any individuals of these three hybrid taxa, which suggests that they are sterile.

A fourth, previously unnamed hybrid taxon exists (Hennessy 1972) which is fertile. Codd (1956) had already mentioned two specimens with characters intermediate between *E. lysistemon* and *E. caffra*. These are the two Codd collections cited below.

Erythrina × dyeri *E.F. Franklin Hennessy*, hybrid. nov. inter parentes *E. caffram* Thunb. et *E. lysistemon* Hutch. (subgen. *Erythrina* sect. *Caffrae*) quasi intermedia, ab ambobus vexillo breviore differt. Typus: Natal, 2931 (Stanger): Durban, Wentworth and Brighton Beach (–CC), *Hennessy 445* (holotypus Durban-Westville; isotypi NH; PRE).

Tree, c. 10 m tall, branched; bark grey-buff, thin, smooth with shallow longitudinal fissures; branches sparingly armed with short, conical or falcate brown prickles 5 mm long. *Leaves* pinnately trifoliolate, terminal leaflet 25–50 mm remote from laterals, green, chartaceous, minutely pubescent on both surfaces when young, becoming glabrous, deciduous; stipules ovate-lanceolate, 5–6 mm long, caducous;

TABLE 2.—Comparison of measurements of corolla parts of *Erythrina caffra*, *E. lysistemon* and *E.* × *dyeri*

	E. caffra ($\bar{x}$ of 65)	*E.* × *dyeri* ($\bar{x}$ of 55)	*E. lysistemon* ($\bar{x}$ of 65)
Vexillum length (mm)	56,3	53,5	71,1
Vexillum breadth (mm)	37,8	33,8	32,8
Vexillum angle of curvature (°)	47,6	41,0	28,4
Ala length (mm)	25,9	18,9	14,8
Ala breadth (mm)	11,9	7,9	5,7
Carina length (mm)	22,2	15,3	11,1
Carina (1) breadth (mm)	14,9	10,5	7,0

TABLE 3.—Comparison of relative proportions of corolla parts of *Erythrina caffra*, *E. lysistemon* and *E.* × *dyeri*

	E. caffra	*E.* × *dyeri*	*E. lysistemon*
Vexillum length : breadth	1,49 : 1	1,58 : 1	2,17 : 1
Ala length : breadth	2,18 : 1	2,41 : 1	2,59 : 1
Carina (1) length : breadth	1,49 : 1	1,46 : 1	1,39 : 1
Vexillum length : ala length	2,17 : 1	2,83 : 1	4,80 : 1
Vexillum length : carina length	2,54 : 1	3,50 : 1	6,40 : 1
Ala length : carina length	1,16 : 1	1,24 : 1	1,52 : 1

petiole glabrescent, adaxially grooved, sparingly armed with falcate prickles or unarmed, 70–130 mm long; stipellae 4, paired, one pair at apex of petiole, one at apex of rhachis, green, glandular; petiolules glabrescent, 6–10 mm long; terminal leaflet usually unarmed, broadly ovate with cuneate base, apex acute, obtuse or acuminate, 50–130 × 45–130 mm; lateral leaflets usually unarmed, broadly ovate, equal- or unequal-sided with cuneate base, apex acute or acuminate, 50–120 × 45–85 mm. *Inflorescence* a subterminal pseudoraceme, precocious; peduncle pubescent, olive green, brown or purple, terete, 55–200 mm long; bracts ovate-lanceolate, pubescent, caducous. *Flowers* subverticillate in groups of 3, crowded; pedicel pubescent, 3–6 mm long; bracteoles linear-lanceolate, pubescent, caducous, distally situated, 2–4 mm long. *Calyx tube* ± campanulate, pubescent, splitting laterally to become bilabiate at anthesis, olive-green proximally, reddish brown distally becoming brown, 12–19 mm long; lobes 5, obsolescent, thickened, abaxial lobe prognathous in bud. *Vexillum* conduplicate-falcate, scarlet, glabrous, spread and reflexed at maturity, 49–58 × 29–36 mm. *Alae* falcate, long-clawed, greenish white flushed scarlet with violet or purple distal marginal zone, 16–21 × 7–9 mm. *Carina* of two broadly boat-shaped, abaxially partly connate or rarely free petals, green spotted with scarlet with purple or violet border distally, each 14–17 × 9–12 mm; alae and carina partially exposed at anthesis. *Stamens* 10, diadelphous, vexillary stamen coherent or free, with a distinct genuflexion proximally; filaments green proximally, purple distally, of two alternating lengths 34–41 and 39–46 mm, connate proximally for 24–34 mm; anthers uniform, bithecate with longitudinal dehiscence, dorsifixed, ochreous, 3 mm long. *Gynoecium* 47–55 mm long; gynophore green, hispid, c. 10 mm long; ovary linear, multiovulate, olive-green, pubescent, c. 20 mm long; style terminal, terete, hispid proximally, purple, 17–25 mm long; stigma terminal, small, capitate, green. *Fruit* stipitate, subligneous, falcate, moniliform, glabrescent, blackish, dehiscing adaxially, up to 200 mm long × 13 mm in diameter in broadest part. *Seeds* scarlet, elliptic, 8–10, × 5–6 mm; hilum oval, depressed, blackish, c. 5 × 2 mm.

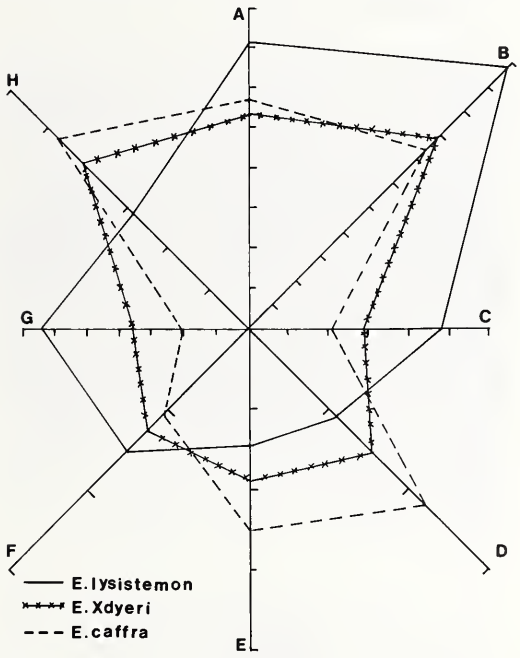

FIG. 7.—Superimposed polygonal graphs of eight corolla characters of plants of *Erythrina caffra, E. lysistemon* and *E.* × *dyeri*:

A	vexillum length	:	unit 10 mm
B	vexillum $\frac{\text{length}}{\text{breadth}}$	:	unit 0,2
C	$\frac{\text{vexillum length}}{\text{ala length}}$	:	unit 1,0
D	carina length	:	unit 10 mm
E	ala length	:	unit 10 mm
F	$\frac{\text{ala length}}{\text{carina length}}$	:	unit 1,0
G	$\frac{\text{vexillum length}}{\text{carina length}}$	:	unit 1,0
H	vexillum curvature	:	unit 10°

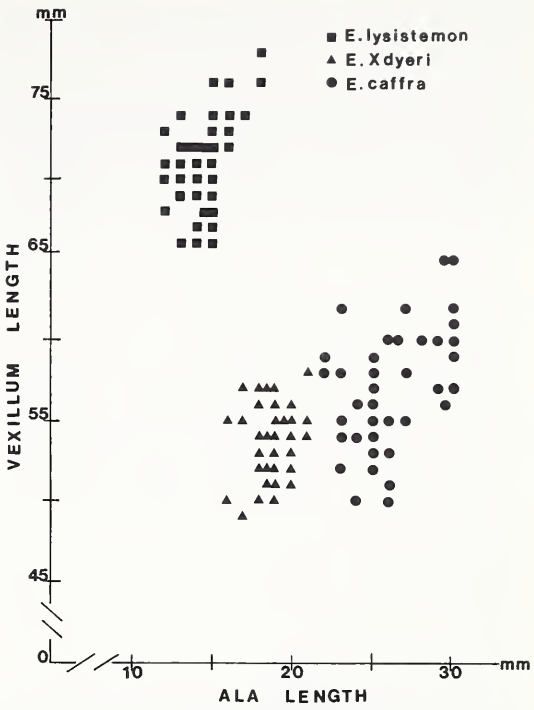

FIG. 8. — Scatter diagram of two corolla characters of plants of *Erythrina caffra, E. lysistemon* and *E.* × *dyeri*.

NATAL.—2931 (Stanger): Wentworth towards Brighton Beach (–CC), *Hennessy 445* (Durban-Westville; NU; PRE). 3030 (Port Shepstone): Marburg Mission (–CB) *Codd 7999* (K; PRE).

TRANSKEI.—3128 (Umtata): 6 miles NW of Elliotdale, (–DC), *Codd 7983* (PRE).

This hybrid of the winter-flowering species *E. caffra* and *E. lysistemon,* both members of section *Caffrae,* occurs on the coastbelt of Natal and Transkei where the parent species are either sympatric or grow together in cultivation.

Of the four hybrid taxa *E.* × *dyeri* is the most difficult to recognize. The difficulty is compounded by introgression.

Living specimens of the parent species are not difficult to distinguish on inflorescence and floral characters. Vegetative differences are not as well defined although, in general *E. caffra* is a bigger tree with fewer prickles and larger leaflets than *E. lysistemon*.

The two most conspicuous differences between the parent species are the shape of the inflorescence, which is attributable to the shape and attitude of the vexilla of the open flowers, and the colour of the vexillum. Because the vexillum of *E. caffra* is strongly arcuate, spread and reflexed at anthesis thus exposing the inner whorls, the inflorescence is broader than that of *E. lysistemon* in which the margins of the slightly falcate, conduplicate vexillum remain contiguous at anthesis, concealing the inner whorls. The shape of the inflorescence is fairly well preserved in dried specimens. The colour of the vexillum of both parent species varies in intensity in different individuals. That of *E. caffra* ranges from deep vermilion-red through orange to creamy-white whereas that of *E. lysistemon* ranges from deep scarlet through pillar-box red to pink to white. Albino forms of both species are very rare. Colour is not preserved in dried specimens.

The shape of the inflorescence of *E.* × *dyeri* resembles that of *E. caffra* whereas the colour of the vexillum is like that of *E. lysistemon*. Living specimens of *E.* × *dyeri* are often misidentified as red-flowered plants of *E. caffra*. No pale colour forms of the hybrid have yet been found. Presumably both

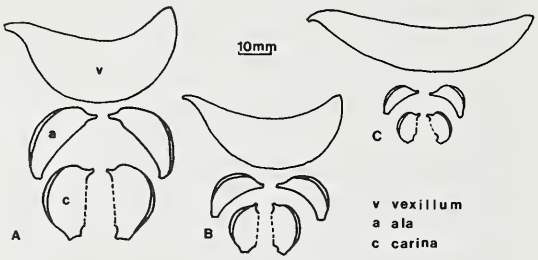

FIG. 9. — Outlines of corolla parts of A, *Erythrina caffra*; B, *E.* × *dyeri* and C, *E. lysistemon*.

FIG. 10. — Inflorescence: A, *E. caffra*; B, *E. lysistemon*; C, *E.* × *dyeri*. Young infructescence: D, *E.* × *dyeri*.

parents would have to be pale forms for such lack of colour to manifest itself in the hybrid.

In order to determine the floral characters which can be reliably and easily used to identify the F_1 hybrid and to distinguish it from its parents, inflorescences were obtained from each of five different trees of *E. caffra* and of *E. lysistemon* and one tree of *E.* × *dyeri* in the Durban area. Measurements were made of 65 flowers of each parent species and of 55 flowers of the hybrid. Those of the corolla parts are summarized in Table 2. The apparent anomaly of one measurement, vexillum length, which is not intermediate in the flower of the hybrid vanishes when the relative proportions of the corolla parts are considered. These are shown in Table 3 and Figs 7 & 8.

Shrinkage of flower parts occurs in drying, but the relative proportions of these parts do not change. By estimating the relative proportions of the corolla parts of dry herbarium specimens, rehydrated specimens or fresh material, it is possible to distinguish *E. caffra, E. lysistemon* and the F_1 hybrid, *E.* × *dyeri.* Corolla parts of these three taxa are shown in Fig. 9 and photographs of living inflorescences in Fig. 10.

The name *Erythrina* × *dyeri* is proposed for this taxon in honour of Dr R.A. Dyer.

ACKNOWLEDGEMENTS

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IRIDACEAE

THE CORRECT CITATION OF *MONTBRETIA CROCOSMIIFLORA*

The name *Montbretia crocosmiiflora* is generally attributed to Lemoine ex E. Morren in *La Belgique Horticole* 31: 299 & t. 14 (1881). Dr M. P. de Vos also cited it in this form in her revision: The African genus *Crocosmia* Planchon, published in *Jl S. Afr. Bot.* 50,4: 497 (1984). However, Morren's publication is antedated by an unsigned note in the *Floral Magazine* of October 1881, t. 472, as noted by Dr P. J. Kostelijk in *The Plantsman* 5,4: 248 (1984).

On p. 287 of *La Belgique Horticole* 31, mention is made of the death of Gérard Calopin on 18 December 1881. The issue containing Morrens's description of *Montbretia crocosmiaeflora* must therefore have been published in the last days of December 1881 or in 1882, whereas the *Floral Magazine* is dated October 1881. I am not aware of any data indicating that this dating is incorrect.

The editors of the *Floral Magazine,* Burbidge and Dean, must be held responsible for the description with Fitch's drawing. It therefore appears that the correct citation of the hybrid garden *Crocosmia* is *Crocosmia* × *crocosmiiflora* (Lemoine ex Burbidge & Dean) N.E. Br.

The plants shown in the drawings in *La Belgique Horticole* and in the *Floral Magazine* are very much alike; they could well belong to the same cultivar. However, it does not seem possible to assign a cultivar name to these plants. The firm of Lemoine at Nancy introduced the plant into commerce in 1882 (Lemoine, *J. Roy. Hort. Soc.* 25: 128–132, 1900–1901). Named selections have been sold from 1883 onwards.

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LAMIACEAE

A NEW SPECIES OF *STACHYS*

Stachys comosa *Codd,* sp. nov., a *S. natalensi* Hochst. var. *galpinii* (Briq.) Codd inflorescentia compacta, bracteis longioribus et angustioribus differt.

Herba, perennis; caules decumbentes, graciles, parce ramosi, 0,25–0,4 m longi, villosi. *Folia* subsessilia vel breviter petiolata; lamina ovata vel ovato-deltoidea, 20–35 × 14–24 mm, dense villosa, subtus glanduloso-punctata, apice obtuso, basi truncata vel subcordata, margine crenata; petiolus usque ad 7 mm longus. *Inflorescentia* compacta, dense villosa, 30–40 mm longa; bracteae lineari-lanceolatae vel lanceolatae, acuminatae, 10–14 mm longae; verticillastri 2-flori; pedicelli 1 mm longi. *Calyx* tubuloso-campanulatus, 8–10 mm longus, aequaliter 5-dentatus, villosus; tubus 4–5 mm longus; dentes lineari-lanceolati, aristati, 4–5 mm longi. *Corolla* alba vel

dilute malvina, saepe purpureo-maculata, 14–16 mm longa; tubus 7–8 mm longus; labium posticum horizontale, concavum, 5–6 mm longum; labium anticum descendens, 8–9 mm longum. *Stamina* 4, intus labio postico ascendentia; antherae brunneae. *Stylus* filiformis, 4–5 mm exsertus; stigma breviter bifidum.

TYPE.—Natal, Umzinto District, Vernon Crookes Nature Reserve, *Balkwill & Cadman 2082* (PRE, holo.).

Perennial herb; stems decumbent, slender, sparingly branched, 0,25–0,4 m long, villous, with long spreading hairs and shorter gland-tipped hairs. *Leaves* subsessile or shortly petiolate; blade ovate to ovate-deltoid, 20–35 × 14–24 mm, densely villous on both surfaces with minute gland-dots on the under surface, apex obtuse, base truncate to subcordate, margin crenate; petiole up to 7 mm long. *Inflorescence* compact, densely villous, 30–40 mm long; bracts linear-lanceolate to lanceolate, acuminate, 10–14 mm long, the lowermost pair larger and leaf-like; verticils 2-flowered; pedicels 1 mm long. *Calyx* tubular-campanulate, 8–10 mm long, equally 5–toothed, villous; tube 4–5 mm long; teeth linear-lanceolate, aristate, 4–5 mm long. *Corolla* white to pale mauve often flecked with purple, 14–16 mm long; tube 7–8 mm long; upper lip horizontal, concave, 5–6 mm long; lower lip descending, 8–9 mm long. *Stamens* 4, ascending in the upper lip; anthers brown. *Style* filiform, bifid, exserted in the upper lip by 4–5 mm. Fig. 11.

Found on grassy slopes, often among rocks, in southern Natal; flowers in spring and early summer, especially after the grass has been burnt.

NATAL.—3030 (Port Shepstone): Dumisa (–AD), *Rudatis 2033*; Vernon Crookes Nature Reserve (–BC), *Balkwill, Manning, Brophy & Getliffe Norris 1013*; *Balkwill & Cadman 2082*; *2209*; near Harding, Bedford Farm (–BC), *Balkwill & Cadman 2794*.

During recent studies in *Stachys* (Codd in *Bothalia* 12: 181, 1977; *Fl. S. Afr.* 28,4: 51, 1985), the *Rudatis* specimen listed above was included, with some hesitation, in *S. natalensis* var. *galpinii* because of its somewhat similar densely villous pubescence, though it differed in the compact inflorescence and longer and narrower floral bracts. Since then several matching specimens have been collected by Balkwill and his colleagues of the University of Natal, Pietermaritzburg, which support the view that a sufficiently clear-cut entity is involved to warrant separate species status.

In the keys previously provided, *S. comosa* would tend to run to *S. flexuosa* Skan because of its relatively compact inflorescence. However, plants of the latter species are smaller, with stems up to 0,25 m in length and the bracts and calyx are hispid, not densely villous as in *S. comosa*.

FIG. 11. — Holotype of *Stachys comosa, Balkwill & Cadman 2082.*

A NEW SPECIES OF *THORNCROFTIA*

Thorncroftia media *Codd,* sp. nov., a *T. succulenta* (Dyer & Bruce) Codd pubescentia pilis simplicibus, foliis subintegris, inflorescentia laxiora differt.

Frutex semisucculentus, c. 0,6 m altus, basi ramosus; caules erecti, parce ramosi, teretes, demum glabrescentes. *Folia* petiolata, semisucculenta; lamina elliptica vel ovato-elliptica, 35–65 × 25–35 mm, utrinque tomentosa et glanduloso-punctata pilis simplicibus, apice rotundato, basi cuneata, margine subintegra; petiolus 20–30 mm longus. *Inflorescentia* terminalis, paniculata, satis condensata, usque ad 250 mm longa, 100 mm lata; rhachis glanduloso-tomentosa; bracteae persistentes, basi racemi foliaceae, superne sensim reductae demum c. 4 mm longae, floribus axillaribus solitariis, pedicellis 1–2 mm longis. *Calyx* campanulatus, glandulosus, aliquantum bilabiatus, demum 5–6 mm longus; lobus posticus ovato-deltoideus, 2 mm longus; lobus anticus subaequaliter 4–dentatus, dentibus lanceolato-deltoideis, acuminatis, 1,5 mm longis. *Corolla* tubulosa, apice 4-lobata, lilacina, lobis purpureo-maculatis; tubus anguste cylindricus, 20–22 mm longus, 2 mm diam., leviter compressus, breviter glandulosotomentosus; lobus posticus erectus, obcordatus 5–6 × 4 mm, lobi laterales deflexi, lineari-lanceolati, acuminati, 5–6 × 1 mm; lobus anticus cymbiformis, 6–7 mm longus, demum reflexus. *Stamina* 4, filamentis liberis, 3–4 mm longis, fauce corollae insertis.

Ovarium 4-lobatum, glabrum; stylus filiformis, 7 mm exsertus; stigma breviter bifidum.

TYPE.—Transvaal, Drakensberg range, west of Trichardtsdal (2430CC), cultivated in BRI nursery, *Hardy 3966* (PRE, holo.).

Semi-succulent shrub, c. 0,6 m tall, branching at the base; stems erect, sparingly branched, terete, eventually glabrescent. *Leaves* petiolate, semi-succulent; blade elliptical to ovate-elliptical, 35–65 × 25–35 mm, tomentose and gland-dotted on both surfaces with simple hairs, apex rounded, base cuneate, margin subentire; petiole 20–30 mm long. *Inflorescence* terminal, paniculate, fairly dense, up to 250 mm long, 100 mm broad; rhachis glandular-tomentose; bracts persistent, those at the base of the raceme leaf-like, becoming smaller towards the apex and eventually c. 4 mm long, with the flowers axillary, solitary, pedicels 1–2 mm long. *Calyx* campanulate, glandular, somewhat bilabiate, eventually 5–6 mm long; posticous lobe ovate-deltoid, 2 mm long; anticous lobe subequally 4-toothed, teeth lanceolate-deltoid, acuminate, 1,5 mm long. *Corolla* tubular with the apex 4-lobed, lilac with the lobes purple-flecked; tube narrowly cylindrical, 20–22 mm long, 2 mm in diam., slightly compressed, shortly glandular-tomentose; posticous lobe erect, obcordate, 5–6 × 4 mm; lateral lobes deflexed, linear-lanceolate, acuminate, 5–6 × 1 mm; anticous lobe cymbiform, 6–7 mm long, eventually reflexed. *Stamens* 4, filaments free, 3–4 mm long, attached in the throat of the corolla. *Ovary* 4-lobed, glabrous; style filiform, exserted by 7 mm; stigma shortly bifid. Fig. 12.

FIG. 12. — Holotype of *Thorncroftia media, Hardy 3966.*

Known only from the type gathering *(Hardy 966),* collected on rocky slopes of the Drakensberg Range in the eastern Transvaal, north-west of the Olifants River poort and more or less due west of Trichardtsdal, and cultivated in the BRI nursery. Access to this part of the Drakensberg Range is difficult, as there are no roads into the mountains between the Olifants River and the road over the mountains at The Downs, some 45 km to the north-west. The opportunity to make a small collection in the area arose when Mr Hardy accompanied a helicopter expedition engaged on the eradication of *Cannabis* plantings.

In corolla characters and growth habit *T. media* resembles *T. succulenta* but, in the latter species, the leaf blade tends to be smaller (16–30 × 15–20 mm) with the margin crenate in the upper half, and the tomentum on leaves and stems consists mainly of dendroid hairs. In *T. succulenta* the inflorescence is also smaller and denser than in *T. media.* T. *succulenta* occurs on the Soutpansberg and has been recorded on the escarpment opposite Mariepskop and from the mountains east of Barberton. It is possible, therefore, that it may occur at other localities along the eastern escarpment but, in the short time at his disposal, Mr Hardy did not encounter it. Obviously more information is desirable on the distribution of the two species and whether there is any intergradation between them, but there seems to be little chance of further study being possible in this mountainous area in the near future.

Another related species, *T. longiflora* N.E. Br., which has so far been recorded only from the mountains above Joe's Luck Siding east of Barberton, has a similar greyish tomentum of simple hairs but the leaves are very much smaller (10–20 × 4–10) and the corolla tube is considerably longer (30–38 mm) than in *T. media.*

L. E. CODD

LILIACEAE

A METHOD FOR THE NON-DESTRUCTIVE EXAMINATION OF LEAVES OF *ALOE* SPECIES BY SEM

Cutler and Brandham (1977; see also Cutler 1969, 1972 and Brandham & Cutler 1978) have shown that the leaf surface structure of members of *Aloineae* is not only under precise genetic control with little if any environmental influence, but is also species (or infra-specific taxon) specific. This means that it can be used to identify otherwise unidentifiable specimens, and to assist in the identification of others.

Techniques are known for preparing surface-anatomical material of dried herbarium specimens without disturbing them and causing minimal distortion. The making of replicas is a well known method of examining otherwise difficult material by both scanning and transmission electron microscopy. The application of replicas to scanning electron microscopy (SEM) is reviewed by Hearle *et al.* (1974). As part of a study of the southern African species of *Aloe* for the *Flora of southern Africa,* we experimented with a number of replica techniques, notably those of Chapman (1967) using polystyrene foam dissolved in toluene, of De Winter (pers. comm.) using clear nail varnish, and of Watkins (pers. comm.). We found Watkins' technique of using a small piece of cellulose acetate film soaked in acetone was ideal for application to valuable specimens, because the dry acetate replica lifts off the specimen without damaging it, and removes at most some of the surface wax and dust. A piece of cellulose acetate film c. 10 × 5 mm (the dimensions are not critical) is softened for a few seconds in acetone and laid on a suitable piece of leaf epidermis. A drop of acetone on the film will further soften it so much that all but the smallest air bubbles are removed, and an impression of the leaf is formed. After ten to twenty minutes the film dries and releases itself from the specimen. It may then be trimmed, if necessary, and mounted and coated for viewing by SEM in the normal manner.

As the material actually examined is a negative replica, it must be noted that papillae, micropapillae and ridges appear on the pictures as hollows of various shapes, and stomatal cāvities appear as humps. Wax deposits appear 'right way round', but are seen

FIG.14. — Acetate replica of a specimen of *Aloe namibensis, Giess* 10459 in PRE. The scale bar is approximately 140 μm long.

FIG. 13. — Live material of leaf of *Aloe namibensis, Hardy 6330* in PNBG 28193. The scale bar is approximately 135 μm long.

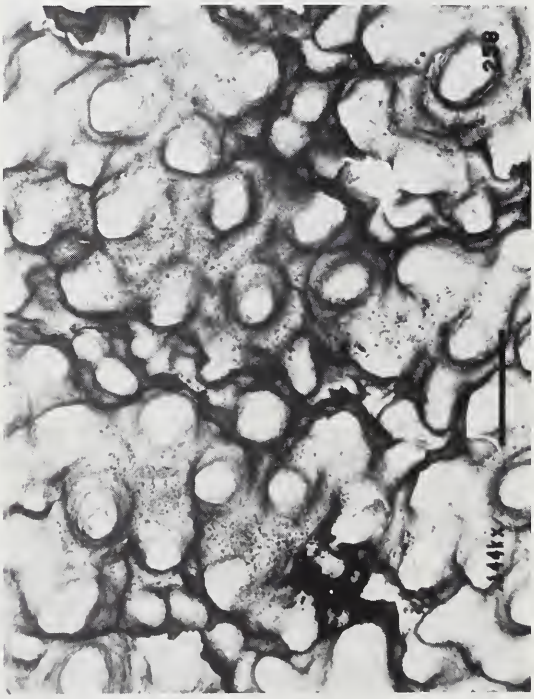

FIG. 15. — Negative of Fig. 14. The scale bar is approximately 140 μm long.

from below rather than from above. The practical effect of this may be seen by comparing the picture of live material of *Aloe namibensis* in Fig. 13 with the replica in Fig. 14.

An interesting optical illusion may be noted when using these replicas (see Fig. 15). This is the negative of Fig. 14. In negatives of SEM pictures of replicas made as described above, hairs, papillae, micropapillae, ridges and hollows are seen in an approximation to their correct perspective; this is seen when Fig. 15 is compared with Fig. 13.

An example of the use of characters made available by this method, that would otherwise have been unavailable to the investigators, is given by Glen & Hardy (in press).

We thank Mr R. M. Watkins (Wirsam Scientific) for suggesting this method to us, and Mrs S. M. Perold for help with the minutiae of SEM specimen preparation. Thanks are also due to Drs G. E. Gibbs Russell and O A. Leistner for reading drafts of this note and offering helpful comment and advice.

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H. F. GLEN and D. S. HARDY

MESEMBRYANTHEMACEAE

A NEW COMBINATION IN *LAMPRANTHUS*

A proposal was made (Glen 1980) and accepted (Brummitt 1983) to conserve the generic name *Lampranthus* N.E. Br. against the earlier name *Oscularia* Schwant. if both names were considered to refer to the same genus. Glen (1978) showed that all three names published in the genus *Oscularia* belong to the same species, that this species could not be held separate from the genus *Lampranthus,* and that it belongs to the section *Lunati* of that genus. However, the necessary new combination has not been published until now.

Lampranthus deltoides *(L.) Glen,* comb. nov.

Mesembryanthemum deltoides L., Sp. Pl. edn 1, 482 (1753); Gouan, Hort. Monspel. 244 (1765); Mill., Gard. Dict. edn 8, n. 11 (1768); Soland. in Ait., Hort. Kew. edn 1, 2: 183 (1789); Gmel., Syst. Nat. edn 14, 2: 844 (1791); Haw., Obs. Gen. Mesemb. 2: 364 (1795); Willd., Sp. Pl. edn 5, 2: 1052 (1799); DC., Hist. Pl. Succ. t. 53 (1800); Haw., Misc. Nat. 74 (1803); Willd., Enum. Pl. Hort. Berol. 539 (1809); Haw., Syn. Pl. Succ. 296 (1812); Hornem., Hort. Reg. Hafniae 465 (1815); Haw., Rev. Pl. Succ. 133 (1821); DC., Prodr. 3: 433 (1828); Salm Dyck, Monogr. Gen. Aloes Mesemb. § 30 f. 3 t. 24 (1840); D. Dietr., Syn. Pl. 3: 140 (1843); Sond., F. C. 2: 421 (1862); Berger, Mesemb. Portulac. 190 (1908); N.E. Br. in Jl Linn. Soc. Bot. 45: 118 (1920). *M. deltoideum* L., Syst. Nat. edn 10, 1059 (1758). *Oscularia deltoides* (L.) Schwantes in Möllers dt. Gärtn.-Ztg 42: 187 (1927); Jacobsen, Handb. Succ. Pl. 3: 1338 (1960); in Lex. Succ. Pl. 535 (1974). Iconotype: Dill., Hort. Eltham. t. 195 f. 246 (1732). Typotype: *Dillenius s.n.,* hort. (OXF!).

M. caulescens Mill., Gard. Dict. edn 8, n. 12 (1768); Haw., Obs. Gen. Mesemb. 2: 367 (1795); in Misc. Nat. 74 (1803); in Syn. Pl. Succ. 296 (1812); Hornem., Hort. Reg. Hafniae 465 (1815); Haw., Rev. Pl. Succ. 133 (1821); DC., Prodr. 3: 433 (1828); Salm Dyck, Monogr. Gen. Aloes Mesemb. § 30 f. 3 t. 23 (1840); D. Dietr., Syn. Pl. 3: 140 (1843); Sond., F.C. 2: 421 (1862); Berger, Mesemb. Portulac. 188 (1908). *M. deltoides* L. var. δ L., Sp. Pl. edn 2, 690 (1762); Soland. in Ait., Hort. Kew. edn 1, 2: 183 (1789). *O. caulescens* (Mill.) Schwantes in Möllers dt. Gärtn.-Ztg 42: 187 (1927); Jacobsen, Hand. Succ. Pl. 3: 1338 (1960); in Lex. Succ. Pl. 535 (1974). Iconotype: Dill., Hort. Eltham. t. 195 f. 243–4 (1732). Typotype: *Dillenius s.n.,* hort. (OXF!).

M. deltoides L. var. *majus* Weston, Universal Botanist 1: 169 (1770); Haw., Obs. Gen. Mesemb. 2: 366 (1795); N.E. Br. in Jl Linn. Soc. Bot. 45: 118 (1920). *O. deltoides* (L.) Schwantes var. *major* (Weston) Schwantes ex Jacobsen in Fedde Reprium Beih. 106: 158 (1938); Jacobsen, Handb. Succ. Pl. 3: 1338 (1960); in Lex. Succ. Pl. 535 (1974). *O. deltata* (Mill.) Schwantes var. *major* (Weston) Schwantes in Möllers dt. Gärtn.-Ztg 42: 187 (1927). Iconotype: Dill., Hort. Eltham. t. 196 f. 247 (1732). Typotype: *Dillenius s.n.,* hort. (OXF!).

M. muricatum Haw., Obs. Gen. Mesemb. 2: 364 (1795); in Misc. Nat. 75 (1803); in Syn. Pl. Succ. 297 (1812); in Rev. Pl. Succ. 133 (1821); DC., Prodr. 3: 433 (1828); Salm Dyck, Monogr. Gen. Aloes Mesemb. § 30, f. 3 t. 25 (1840); D. Dietr., Syn. Pl. 3: 140 (1843); Sond., F.C. 2: 421 (1862). *M. deltoides* L. var. *muricatum* (Haw.) Berger, Mesemb. Portulac. 190 (1908). *O. muricata* (Haw.) Schwantes ex Jacobsen, Sukk. Lex. 478 (1970) in synonymy, comb. illegit. Iconotype: Dill., Hort. Eltham. t. 195 f. 246 (1732). Typotype: *Dillenius s.n.,* hort. (OXF!).

M. deltoides L. var. *simplex* DC., Hist. Pl. Succ. t. 53 (1800). Type not stated.

M. deltoides L. var. *pedunculatum* N.E. Br. in Jl Linn. Soc. Bot. 45: 118 (1920). *O. deltoides* (L.) Schwantes var. *pedunculata* (N.E. Br.) Schwantes ex Jacobsen in Fedde Reprium Beih. 106: 158 (1938). *O. pedunculata* (N.E. Br.) Schwantes in Natn. Cact. Succ. Jl 4: 58 (1949); Jacobsen, Handb. Succ. Pl. 3: 1338 (1960); in Lex. Succ. Pl. 535 (1974). Syntypes: *Schlechter 9045,* Nuwekloof (K!); *Scott Elliot 228,* Nuwe Kloof (K!).

Oscularia deltata (Mill.) Schwantes in Möllers dt. Gärtn.-Ztg 42: 187 (1927). Type: not stated, but apparently based on Miller's description of *M. deltoides.*

The pre-Linnaean citations listed by Glen (1978) are not repeated here, in order to save space.

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H. F. GLEN

ORCHIDACEAE

NOTES ON THE DISINAE FOR THE *FLORA OF SOUTHERN AFRICA*

While checking the account of the Disinae for the *Flora of southern Africa*, the following problems requiring discussion or resolution were found.

1. *Disa* subgen. *Micranthae* has not been validly published. In a previous account (Linder 1981: 9) I referred to a 'subgen. Micranthe', but did not indicate the type or basionym. *Disa* Berg. subgen. *Micranthae* (Lindl.) Linder, stat. nov., *Disa* Berg. sect. *Micranthae* Lindl., Gen. Sp. Orch. 347 (1838). Lectotype species: *Disa chrysostachya* Swartz.

2. *Disa* subgen. *Hircicornu* (Kraenzl.) Linder is based on *Disa* sect. *Hircicornes* Kraenzl. I changed the ending of the name in 1981 in order to satisfy Recommendation 21 B 1 of the ICBN (1978), which states: 'The epithet of a subgenus or a section is preferably a substantive. . .'. However, article 73.1 states that 'The original spelling of a name or epithet is to be retained, except for the correction of typographic or orthographic errors'. Hircicornu cannot be regarded as having an 'incorrect Latin termination', which can be corrected. Recommendation 21 B 2, stating that new epithets for subdivisions of genera should have the same form as already existing names of co-ordinate rank, implies that the epithets are not to be 'corrected', so the correct name of the subgenus would be *Disa* Berg. subgen. *Hircicornes* (Kraenzl.) Linder.

3. *Disa longicornu* L.f. is the correct spelling of what all subsequent authors (except Linder 1982), have called 'Disa longicornis', according to article 73.1 of the Code.

4. *Disa maculomarronina* is the name that McMurtry (1984) gave to a population that Linder (1981: 146) described, but did not name, as a hybrid between *Disa versicolor* and *D. hircicornis.*

Taxonomically, this is a difficult species. *Disa maculomarronina* can readily be separated from *D. hircicornis* by the petals which curve over the anther, and which are ovate and acute, and it can be separated from the South African collections of *D. versicolor* by its constant colouration and only gradually decurved spur. However, the material of *D. versicolor* from Zimbabwe is problematic, as in spur shape and orientation it ranges from *D. maculomarronina* to *D. hircicornis,* it is generally robust as in *D. versicolor* and according to various reports, the colouration is as in *D. maculomarronina.* The type of *D. versicolor,* which is also the only collection from Angola, is the same as the South African *D. versicolor* in all respects. The resolution of the problem in Zimbabwe will probably have to wait until the populations can be studied in the field.

TABLE 4.—Application of early names of *Disa patens* and *D. filicornis* based on the names and types of Linnaeus the Younger

L.f. (1784)	*Orchis filicornis*	*Ophrys patens*
Thunberg (1794)	*Limodorum longicorne*	*Serapias patens*
Swartz (1800)	*Disa patens*	*Disa tenuifolia*
Thunberg (1807)	*Disa filicornis*	*Disa patens*
Lindley (1838)	*Penthea filicornis*	*Penthea patens*

5. *Disa patens/filicornis.* The nomenclatural history of these two quite distinct species has been much confused. The problem dates to the early history of the usage of the names (Table 4).

The diagnoses and typification of the names of Linnaeus the Younger, despite his incompetence at the generic level, are clear and sound. Thunberg (1794), in his *Prodromus,* transferred *Ophrys patens* L.f. to *Serapias,* but from his diagnosis ('Serapias foliis lanceolato-setaceis, spica ovata, floribus perpendicularibus') it appears as if he is referring to *O. filicornis* L.f. For *Orchis filicornis* he published a new, superfluous name, *Limodorum longicorne,* which refers to a *Mystacidium.*

The confusion started with Olof Swartz's (1800) treatment of the group (Fig. 16). In his paper, he lists the species with their synonyms indented, and with descriptions provided as footnotes. New names are printed in italics, while everything else is in roman type. He clearly followed the circumscription, rather than the typification method of nomenclature, and he also recognized the two species. However, following the circumscription method, he placed *Serapias patens* sensu Thunberg in the same species as *Orchis filicornis* L.f. (from their description they are the same), under the name *Disa patens.* He is consistent throughout his paper, preferring Thunberg epithets (usually superfluous) to those of Linnaeus the Younger or the Elder. Consequently 'patens' is printed in roman type, as Swartz regarded it as a 'new combination', not as a new name. However, as Swartz explicitly excluded the type of *Serapias patens* (which is *Ophrys patens* L.f., which Swartz placed into the other species), by the type method 'he is considered to have published a new name that must be ascribed solely to him' (ICBN, 1983, article 48.1), so it should read: *Disa patens* Swartz. Further support for the notion that Swartz regarded *D. patens* as a 'new combination' is the fact that Swartz nowhere in his paper replaced earlier names with 'more appropriate' names, the way that Thunberg did.

For *Ophrys patens* L.f. Swartz proposed a new name, *Disa tenuifolia* Swartz. This name can be regarded as being superfluous, the correct name being *Disa patens,* which was being blocked simultaneously by being erroneously applied to *Orchis filicornis.* This appears to have been the interpretation of all authors to date. The other possible interpretation is that it is an avowed substitute (nomen novum), as there is already a *Disa patens.* This latter interpretation seems better. Swartz, using the circumscription method, and consistently preferring the last epithet applied to a species, would have regarded *Serapias patens,* and hence *Disa patens,* as the 'correct' name for *Orchis filicornis,* thus blocking *Disa patens* (L.f.) Thunb., a later homonym for *Disa patens* Swartz, which Thunberg established in his *Flora Capensis* of

214 *1800, Jul. Aug. Sept.*

D. *tenuifolia* Sw. patens.
Serapias Th.
Ophrys patens
Orchis filicornis
ſuppl.
ſuppl.

3. SATYRIUM. (THUNB.) Tab. III. C.

Char. eſſent. *Calyx* ringens: *foliolo* ſuperiore fornicato, poſtice bicalcarato, ceteris *labello*que baſi coalito.
Anthera ſtylo elongato adnata ſub *Stigmate* terminali.

Character naturalis.

Calyx ringens, 5-phyllus:
Foliola omnia baſi coalita. Tria *exteriora*, qvorum *unum* ſuperius f. poſterius maximum, fornicatum, baſi Calcaria duo variæ longitudinis poſtice exſerens; *duo* anteriora, lanceolato-linearia.
Duo interiora minora ſtylo foliolisque exterioribus baſi accreta.

Cor.

D. *tenuifolia:* galea acuminata erecto-patens concava ecalcarata, labello filiformi; caule ſubbifloro, foliis ſetaceis.
D. *patens:* galea acuminata erecto-patens concava ecalcarata; labello filiformi; ſpica ovata multiflora; foliis lineari-lanceolatis.

FIG. 16. — The treatment of *Disa tenuifolia* and *D. patens* by Swartz. The synonymy and names are given at the top of the page, new names are printed in italics. The diagnoses are given at the bottom of the page.

1807, a work in which he ignored Swartz's earlier work. Unfortunately, authors in the 19th and 20th centuries managed to get the names confused. Lindley (1838) transferred both *Ophrys patens* and *Orchis filicornis* to *Penthia,* a treatment followed by Rolfe (1913). However, Schlechter (1901), Kraenzlin (1900), Bolus (1911) and Linder (1981, 1982) mistakenly upheld *Disa patens* Swartz, a name which is clearly superfluous, and so illegitimate. Linder (1985) interpreted *Disa tenuifolia* Swartz as superfluous, and proposed *D. lutea* Linder as an avowed substitute, a name which would now have to be regarded as superfluous.

The full synonymy of the two species is now:

1. **Disa filicornis** (L.f.) Thunb. (1807); *Orchis filicornis* L.f. (1784); *Limodorum longicorne* Thunb. (1794); *Disa patens* Swartz (1800); *Penthea filicornis* (L.f.) Lindl. (1838). *Penthea reflexa* Lindl. (1838); *Disa reflexa* (Lindl.) Reichb.f. (1865).

2. **Disa tenuifolia** Swartz (1800); *Ophrys patens* L.f. (1784); *Serapias patens* Thunb. (1794); *Disa patens* (L.f.) Thunb. (1807) non Swartz (1900); *Penthea patens* (L.f.) Lindl. (1838); *Disa lutea* Linder (1985).

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H. P. LINDER

PERTUSARIACEAE

A NEW SPECIES OF *PERTUSARIA*

Pertusaria salax *Brusse,* sp. nov.

Thallus sulphureus, saxicola, usque ad 110 mm diametro, 0,2–1,0 mm crassus, areolatus, areolis 0,2–2,0 mm latis, rimis saepe 0,1–0,2 mm latis, isidiis sorediisque destitutus. *Algae* 5–14 µm diametro, ad *Trebouxiam* pertinentes. *Ascomata* hyalina, perithecioidea, 0,5–0,8 mm diametro, 2–6 in verrucis thallinis apothecioideis immersa, interdum confluentia. *Verrucae* 1,5–3,0 mm diametro, basin versus constrictae (substipitatae). *Parietes peritheciorum* hyalini, 13–40 µm crassi, periclinate prosoplectenchymati. *Hymenium* hyalinum, circa 500 µm altum. *Paraphyses* pernumerosae, graciles, laxae, ramosae et anastomosae, 1,5–2,0 µm crassae. *Gelatinum* copiosum, J–. *Asci* cylindrici, 350–500 × 80–110 µm, parietibus aequaliter crassis, J+ valde cyaneis. *Ascosporae* singulares vel binae, hyalinae, ellipsoideae, pergrandes, 175–250 × 70–100 µm, halonatae, lumenibus etruncatis; paries externus tenuis, 1,0–3,5 µm crassus, pagina interna reticulate undulata; paries internus 17–20 µm crassus, polis non incrassatis.

Pycnidia globosa, immersa, hyalina, circa 200 µm diametro. *Pycnidiosporae* teretes, pertenues, extremitatibus truncatis, hyalinae, rectae, 18–24 × 1,2–1,3 µm. *Thallus* unum xanthonorum et acidum norstictic um continens.

TYPUS.—South West Africa/Namibia, 2715 (Bogenfels): Diamond area no. 1, summit of Buchuberg, c. 90 km N of Oranjemund. On schist on steep E slope (–DD), *G. Williamson 2898,* 1982.04 (PRE, holo.; LD, iso.). Fig. 17.

Thallus yellow, saxicolous, up to 110 mm in diameter, 0,2–1,0 mm thick, areolate, areoles 0,2–2,0 mm across, fissures often 0,1–0,2 mm wide, isidia and soredia absent. *Algae* 5–14 µm in diameter, *Trebouxia. Ascomata* hyaline, perithecioid, 0,5–0,8 mm in diameter, 2–6 immersed in thalline, apothecioid verrucae. *Verrucae* 1,5–3,0 mm in diameter, constricted at the bases (substipitate). *Perithecial walls* hyaline, 13–40 µm thick, periclinally prosoplectenchymatous. *Hymenium* hyaline, about 500 µm high. *Paraphyses* abundant, slender, flaccid, branched and anastomosed, 1,5–2,0 µm thick. *Gel* copious, J–. *Asci* cylindrical, 350–500 × 80–110 µm, 1- or 2-spored, walls evenly thick, J+ strongly blue. *Ascospores* very large, oval, hyaline, 175–250 × 70–100 µm, halonate, lumens not truncated; outer wall thin, 1–3,5 µm thick, with the inner surface (junction between the two walls) reticulately rippled; inner wall 17–20 µm thick, poles not thickened. *Pycnidia* globose, immersed, hyaline, about 200 µm in diameter. *Pycnidiospores* hyaline, straight, very narrowly cylindrical with truncate ends, 18–24 × 1,2–1,3 µm. *Chemistry:* one of the xanthones and norstictic acid present (TLC).

This genus is fairly well known in Europe (Erichsen 1936; Poelt 1969) and in the United States and Canada (Dibben 1980), but is otherwise rather poorly understood. However, this conspicuous new lichen has very large ascospores and a yellow thallus and is distinct in these two characters alone. The ascospores are so large, that they are visible with the naked eye, and are easily discernible with a lens. Another yellow saxicolous species, *Pertusaria diaziana* Massal., is common in the Cape floral area further south, but has a less coarse thallus habit, smaller perithecioid ascomata and asci, and 4 (6, 8) much smaller ascospores, with truncated lumens, in the asci. The perithecioid ascomata fuse much more rarely than in *Pertusaria salax,* and the ascomatiferous verrucae are rounded and K–, and not apothecioid and K+ red (norstictic acid), as in the latter. Both species are KC+ bright orange due to the presence of lichen xanthones in the upper zone.

At present this lichen is known only from the type locality, the Buchuberg, some 90 km north of the Orange River mouth.

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F. BRUSSE

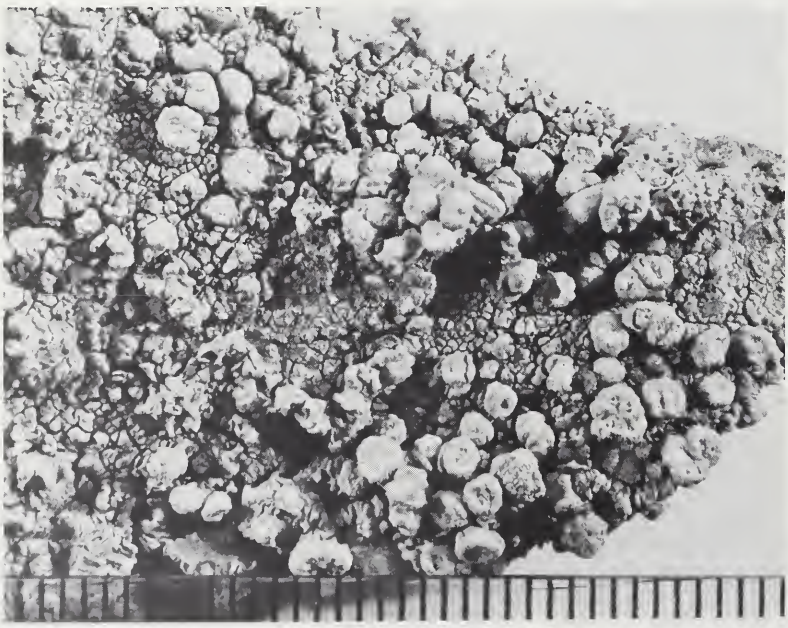

FIG. 17. — *Pertusaria salax* Brusse, *G. Williamson 2898,* holotype. Scale in mm.

POACEAE

DIVERSE NOTES ON SOUTHERN AFRICAN POOIDS

While preparing the account of the Poeae for the *Flora of southern Africa,* I have encountered the following problems, which require a more detailed treatment than is desirable in the Flora. A full taxonomic treatment of the tribe will shortly appear in the Flora, so I will not repeat it here.

1. *Festuca elatior* L.

This taxon has been known in the last decades under the name *F. arundinacea* Schreb. When Linnaeus described *Festuca elatior* in 1753, he included in his protologue elements of two taxa, *F. pratensis* Hudson and *F. arundinacea* Schreb. Subsequently the name has been used for either taxon, or for both, or as *F. elatior* subsp. *arundinacea* (Schreb.) Wimm. and *F. elatior* subsp. *pratensis* (Hudson) A. Gray. Terrell (1967) dealt in detail with the typification of *F. elatior* L., and argued convincingly that this name applies to *F. arundinacea* and not to *F. pratensis* Hudson. Following European practice he then rejected the name as a *nomen ambiguum.* However, subsequent to the Leningrad Conference, *nomina ambigua* no longer exist, and the name must be used. According to Terrell (1967: 131) the type specimen is specimen no. 92.17 in LINN. I formally propose it here as the lectotype:

Festuca elatior *L.*, Sp. Pl. 75 (1753). Type: Hortus Upsaliensis, specimen no. 92.17 (LINN, lecto.) (lectotypified here).

2. **Festuca dracomontana** *Linder,* sp. nov., a *Festuca camusiana* Saint-Yves arista subterminali, a *Festuca simensis* A. Rich. auriculis parvioribus et aristis brevioribus recedit. Type: Lesotho, 3028 (Matatiele): Letsing La Letsie slopes (–AC), *P. C. V. du Toit 2714* (PRE, holo.!; K!; MO!).

Plants perennial, 0,5–0,8 m tall. *Culms* smooth, terete, rhizomatous at the base and occasionally swollen. *Leaves* cauline; sheaths smooth; ligules membranaceous, glabrous, less than 1 mm long and often lacerated; auricles glabrous, 1–2 mm in diameter; blades expanded, 2–8 mm wide, acute, smooth or somewhat rough, to 200 mm long. *Inflorescence* an open panicle, exserted, to 250 mm long; rhachis smooth, branches somewhat compressed and rough on the edges. *Spikelets* pale green, 10–12 mm long, 3–7-flowered. *Glumes* unequal, acute; lower glume 2,5–4 mm long, 1 (3)-nerved; upper glume 4,5–5 mm long, 3-nerved. *Lemmas* acute, dorsally rounded, 5-nerved, 5,5–8 mm long, scabrid in the upper half with the upper margins membranous; awn subterminal, scabrid, 1–4 mm long. *Paleas* about as long as the lemmas, keels scabrid. *Stamens* 3; anthers 3 mm long. *Styles* 2; mature ovaries not seen. Fig. 18.

Habitat montane grassland in the Natal and Transvaal Drakensberg; rather rare.

LESOTHO.—3028 (Matatiele): Letsing La Letsie slopes (–AC), *P. C. V. du Toit 2714* (K; MO; PRE).

TRANSVAAL.—2528 (Pretoria): Pretoria (–CA), *Meebold 13800* (PRE). 2329 (Pietersburg): Haenertsburg, grassy hillsides (–DD), *Ellis 1874* (PRE).

This curious species, with its disjunct distribution, is quite distinct from all other southern African fescues, but approaches the tropical African species *F. camusiana* Saint-Yves and *F. simensis* A. Rich. The former has terminal awns, and the transverse section (ts) of the leaf is somewhat different. The leaf ts of the latter is the same as *F. dracomontana,* but it has much longer awns and larger auricles. *F. dracomontana* is probably a southern vicariant of *F. simensis,* but it is surprising that *F. simensis* does not reach further south than Kenya.

3. Leaf anatomy of southern African fescues

The arrangement of the vascular bundles and the distribution of sclerenchyma is generally held to be almost species-specific in *Festuca,* especially in the narrow-leaved fescues. Saint-Yves (1929) published drawings of the leaf anatomy of four of the nine southern African species.

Transverse sections of the leaves were prepared from herbarium material, which was briefly softened in boiling water, the silica removed by soaking in HFl for 12 hours, and the leaves sectioned at 20 µm on a slide microtome. The sections were stained with

FIG. 18. — *Festuca dracomontana.*

Safranin, and mounted in 50% glycerol. The results are presented in Fig. 19.

The following groups may be recognized:

(a) *Festuca caprina Nees*: leaves less than 1,5 mm wide, usually folded, with 5–7 vascular traces, and small bundles of sclerenchyma opposite the bundles, more or less embedded in the epidermis, and not reaching the bundles (Fig. 19a; see also Saint-Yves 1929: 97, Fig. 15). *Schelpe 1396* differs from this pattern by having small sclerenchyma bundles on the inside of the vascular traces. This collection also differs morphologically from the typical *F. caprina,* but other collections that agree with *Schelpe 1396* in external morphology have a typical leaf ts.

(b) *Festuca costata* group *(F. costata* Nees and *F. killickii* K.-O'Byrne): leaves with at least 9 traces, often flat. Vascular traces of alternating size. Sclerenchyma reaching from the inner to the outer epidermis, expanded on the inner surface in a T-shaped girder. In *F. costata* the sclerenchyma is continuous

FIG. 19. — Transverse sections of leaves of southern African fescues. Shaded areas indicate sclerenchymatous tissue: a, *F. caprina*, × 100, from *McCallum Webster N 483a*; b, *F. costata*, × 40, from *Hilliard & Burtt 7200*; c, *F. killickii*, × 100, from *Hilliard & Burtt 15211*; d, *F. costata,* × 100, from *Manning, Hilliard & Burtt 16008*; e, *F. scrabra,* × 100, from *Acocks 19731*; f, *F. longipes,* × 40, from *Rogers 12744*; g, *F. vulpioides,* × 100, from *Liebenberg 3811*; h, *F. dracomontana*, × 100, from *Du Toit 2714.*

under the outer epidermis (Fig. 19b, d). In some specimens the leaves are about 0,5 mm wide, and are folded, (Fig. 19d) and agree exactly with Saint-Yves's (1929: 99, Fig. 17) illustration of *F. obturbans* Saint-Yves. However, *F. obturbans* is a northern vicariant of *F. caprina,* occurring from Mt Kilimanjaro northwards to the Yemen, and is in external morphology scarcely distinct from *F. caprina. F. killickii* (Fig. 19c) lacks the subepidermal sclerenchyma that characterizes *F. costata* (Fig. 19d).

(c) *Festuca scabra* group *(F. scabra* Vahl, *F. longipes* Stapf, *F. vulpioides* Steud., *F. africana* (Hack.) W. D. Clayton and *F. dracomontana* Linder): this group has wide, expanded leaves with numerous vascular bundles, all about the same size, seated between two sclerenchymatous bundles, which connect the vascular bundles to the upper and the lower epidermisses (Fig. 19e, f, g, h). Usually the inner epidermal cells in the folds are enlarged. In *F. vulpioides, F. africana* and *F. dracomontana* the sclerenchyma of only some bundles reaches the epidermis.

4. The typification of many of the Poeae and Bromeae indigenous to Southern Africa is difficult. Most of them were described by Nees ab Esenbeck (1841).

Nees frequently recognized several varieties in his species. When he recognized varieties, he included all the material in these varieties, that is, he did not recognize a 'typical' form. As in his study of the Restionaceae (see Linder 1985), these varietal names are not correct, as he did not consistently employ binomials [ICBN 1983, art. 23 (c)]. For example, p. 21: '*Panicum monodactylum* var. a. inferioribus vaginisque pilosulis'; and p. 33: '*Panicum numidianum* var. B. Culmo magis ramoso, vaginis rhachi et ramis racemi hirsutis'. However, later authors occasionally cite the Nees varieties in their diagnoses of new species, such as *Festuca longipes* Stapf, based on *F. costata* 'var. fascicularis' of Nees, and *Bromus firmior* Stapf, based on *B. speciosus* 'var. firmior' of Nees. The course which allows the most consistent treatment of Nees's infraspecific categories appears to be to ignore them for formal nomenclatural purposes.

Nees's herbarium has been scattered, and I have not been able to find any specimens annotated by Nees. Nees identified his material only by collector and locality, so that the identification of isotypes may also be difficult. Generally I have accepted the locality and collector date given on the sheets at Kew, although much of it was added in a hand different to that of the collector.

I have lectotypified isotype material, and where there are several syntypes, I selected the best material as the lectotype. These lectotypifications are given below:

Bromus firmior *(Nees) Stapf* in F.C. 7: 733 (1900). *Bromus speciosus* Nees var. *firmior* Nees, Fl. Afr. Austr. 454 (1841). Type: Cape, in the Stormberge and the Witteberg, 5000–6000 ft, *Drège s.n.* (SAM, lecto.!; TCD!).

Cynosurus odoratus *Lehm ex Nees,* Fl. Afr. Austr. 439 (1841). Type: Cape Province, ? Swellendam Distr., *Mundt* (SAM, lecto.!). Nees cited a *Mundt* collection from the Swellendam District as type. In SAM are two *Mundt* collections, *Zeyher 128*: 'probabiliter in sylvaticus ad Plettenbergs bay lectus', and *Zeyher 25*: 'verisimiliter in distr. George locis sylvaticus lectum'. These labels may be wrong, as this species has not since been recorded from forests, but the collections are probably isotype material.

Festuca africana *(Hack.) W. D. Clayton* in Kew Bull. 40: 727 (1985). *Brachelytrum africanum* Hack. in Bull. Herb. Boissier 3: 382 (Aug. 1895). Type: Transvaal, Houtbosch, *Rehmann 5732* (K, lecto.!).

Festuca caprina *Nees,* Fl. Afr. Austr. 443 (1891). Type: Cape Province, Los Tafelberg near Queenstown, Dec., *Drège s.n.* (K, lecto.!).

Festuca costata *Nees,* Fl. Afr. Austr. 447 (1841). Types: Cape Province, Katberg, *Drège s.n.* (K, lecto.!); Windvogelberg, *Drège s.n.* (SAM!); Winterberg near Phillipstown, *Zeyher s.n.* (K!); at Herrenhuter Mission, *Ecklon & Zeyher s.n.* (not found).

Festuca vulpioides *Steud.,* Syn. Pl. Glum. 1: 305 (1859). *Vulpia megastachya* Nees, Fl. Afr. Austr. 441 (1841), non *Festuca megastachys* Hegetscher & Heer (1840). Type: South Africa, without precise locality, *Drège s.n.* (K, lecto.!; TCD!).

Poa binata *Nees,* Fl. Afr. Austr. 578 (1841). Types: Cape Province, Queenstown Division, Los Tafelberg, *Drège s.n.* (K, lecto.!; E!; TCD!); in mountains between Klipplaatsrivier and Katrivier, *Drège s.n.* (not found).

Puccinellia angusta *(Nees) C.A. Sm. & C. E. Hubb.* in Kew Bull. 1929: 85 (1929). *Sclerochloa angusta* Nees, Fl. Afr. Austr. 381 (1841). Type: Cape Province, Uitenhage, along the Swartkops River, December, *Ecklon s.n.* (SAM, lecto.!; K!).

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H.P. LINDER

PORINACEAE

A NEW SPECIES OF *PORINA* ON LIMESTONE

Porina balanina *Brusse*, sp. nov.

Thallus endolithicus. *Tunica thallina* perithecii hemispherica, fusca, ad basem constricta, 300–700 μm crassa, 1,0–1,5 mm lata, superficiaris crystallis grandibus 50–250 μm crassis (oxalas calcii) inclusis. *Algae* sphaericae vel ellipsoideae, 7–24 μm diametro, ad *Trentepohliam* pertinentes. *Perithecia* hyalina, in textura thallina omnino immersa, 600–800 μm diametro, globosa. *Parietes* hyalini vel straminei, in hydroxido kalii crocescentes, verticale et periclinate prosoplectenchymati, 25–30 μm crassi, ostiolum versus incrassati et paraplectenchymati, cellulis 3–6 μm diametro, badiis, in acido nitrico rosescentibus. *Area circa ostiolum* applanata vel concava, sed non peltulata. *Hymenium* hyalinum, circa 500 μm altum, guttulis inspersis. *Subhymenium* hyalinum, circa 100 μm crassum. *Paraphyses* simplices, perlongae, flaccidae, graciles, 1,0–1,5 μm crassae, ecapitatae, septatae, septis 7–11 μm distantibus, in gelatina inclusae, gelatina hyalina, J–. *Asci* cylindrici, 8-spori, parietibus, apicum inclusis, tenuibus, J–. *Ascosporae* oblique uniseriatae, hyalinae, J–, longe ellipsoideae, triseptatae, 14–19 × 5–7 μm, halone tenue 0,8–1,3 μm crassa circumdatae, parietibus tenuibus. *Pycnidia* globosa, hyalina, 160–180 μm diametro, in textura thallina superficiari immersa, parietibus hyalinis sed apices versus brunneolis. *Pycnidiosporae* bacillares, hyalinae, 3,5–4,2 × 1,0–1,2 μm.

TYPUS.—Cape, 3419 (Caledon): Gansbaai area, Byneskranskop near Strandskloof overlooking the Uilkraals River Valley, on a sandy limestone kranz (–CB). *F. Brusse 3835*, 1981.05.14 (PRE, holo.). Fig.20.

Thallus endolithic. *Thalline covering* of the perithecium hemispherical, fuscous, constricted at base, 300–700 μm thick, 1,0–1,5 mm broad, superficial, embedded with large crystals 50–250 μm thick (calcium oxalate). *Algae* spherical to ellipsoid, 7–24 μm across, *Trentepohlia*. *Perithecia* hyaline, completely immersed in thalline tissue, globose, 600–800 μm in diameter. *Walls* hyaline to stramineous, K+, dingy orange, vertically and periclinally prosoplectenchymatous, 25–30 μm thick, thickened in the ostiolar region and paraplectenchymatous, cells 3–6 μm in diameter, brown, becoming pinkish in concentrated nitric acid. *Ostiolar region* flat or concave (i.e. with a thickened ring around it) but not peltulate. *Hymenium* hyaline, about 500 μm high, inspersed with 'oil droplets'. *Subhymenium* hyaline, about 100 μm thick. *Paraphyses* simple, very long and slender, flaccid, 1,0–1,5 μm thick, septate, septa 7–11 μm apart, ecapitate, embedded in gel, gel hyaline, J–. *Asci* cylindrical, 8–spored, with walls, apices included, thin, J–. *Ascospores* hyaline, long ellipsoid, triseptate, 14–19 × 5–7 μm, obliquely uniseriate, thinly halonate, halo 0,8–1,3 μm thick, walls thin. *Pycnidia* hyaline, globose, 160–180 μm in diameter, immersed in superficial thalline tissue, walls hyaline but brownish above. *Pycnidiospores* hyaline rods, 3,5–4,2 × 1,0–1,2 μm. *Chemistry*: no lichen substances detected by TLC.

This new species is most similar to *Porina corrugata* Müll. Arg., also on limestone, from the Melbourne-Adelaide area of Australia, with a Mediterranean climate similar to that of the south-western Cape. *Porina balanina* is, however, more robust, with larger perithecia and associated thalline tissue.

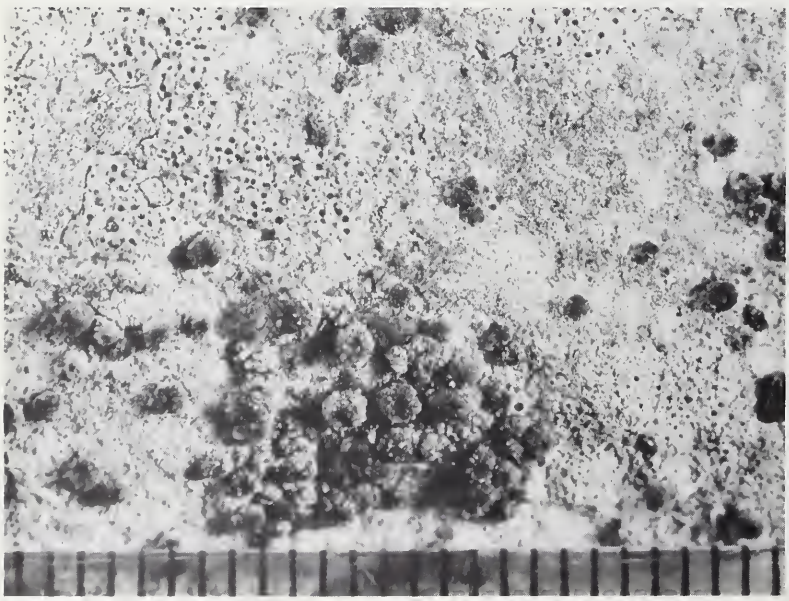

FIG. 20. — *Porina balanina* Brusse, *Brusse 3792*. Scale in mm.

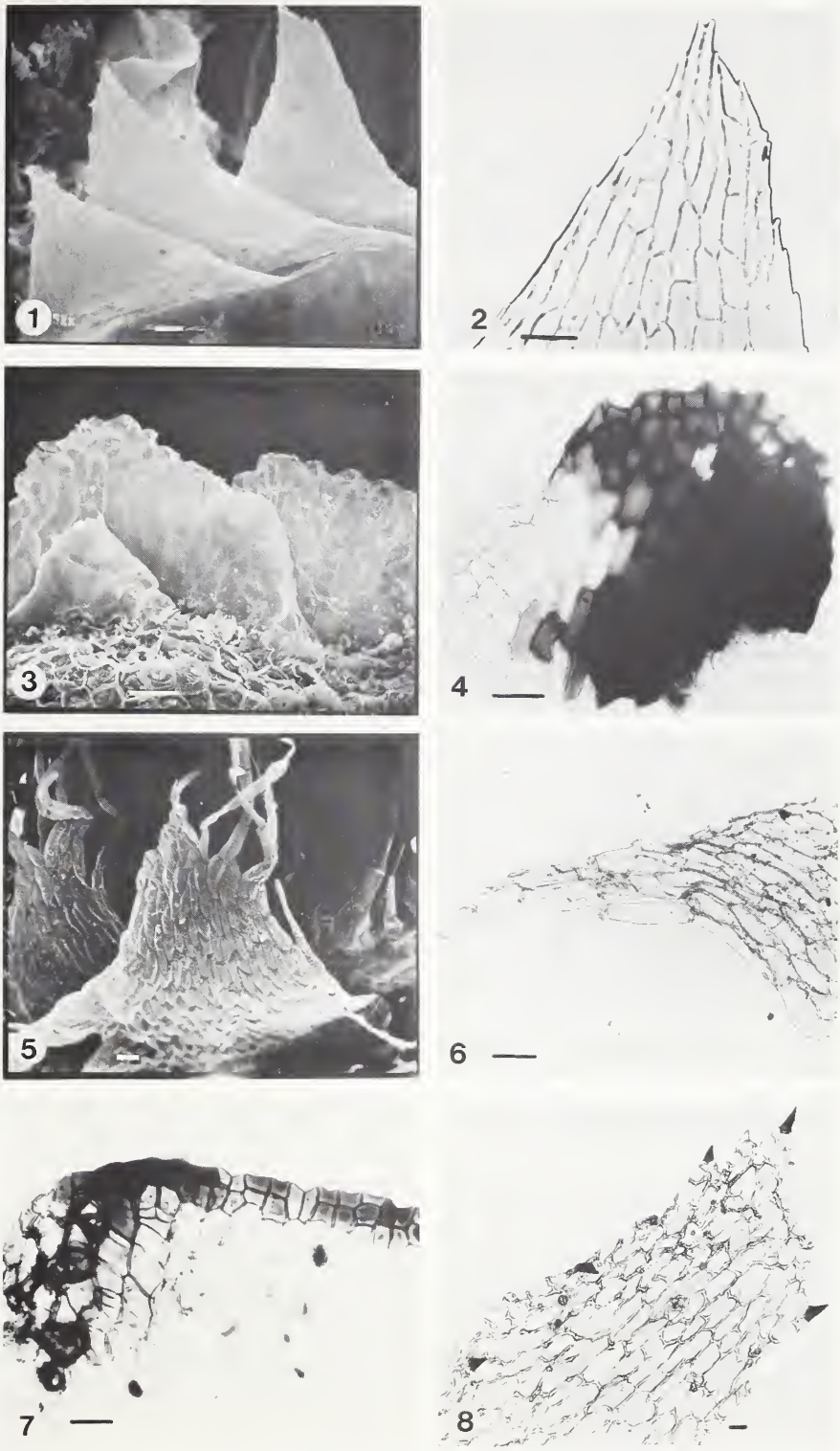

FIG. 21. — Scale margins in different species of *Riccia* and in *Ricciocarpus*. 1, 2, *R. villosa* denticulate at apex; 3, 4, *R. okahandjana* with crenate margins; 5, 6, undescribed *Riccia* species with multicellular appendages; 7, *R. rhodesiae* with crenate margins; 8, *Ricciocarpus natans*, tip of scale, margins dentate. (1, 3, 5, SEM micrographs; 2, 4, 6–8, LM (light microscope) photographs by S. M. Perold). Scale bar = 100 μm.

More importantly, the ascospores are not as delicate and fusiform as in *Porina corrugata*, being narrowly ellipsoid, with sturdier, but still evenly thin, walls and septa.

The walls of the perithecium are pale yellowish or straw-coloured and immediately become dingy orange in a 2 molar solution of potassium hydroxide (K). The pigment does not diffuse and no crystals develop in association with this colour in K.

The new species is known from several limestone localities in the Gansbaai-Bredasdorp area of the south-western Cape, at altitudes lower than 100 m.

CAPE.—3419 (Caledon): Gansbaai area, Byneskranskop near Strandskloof overlooking the Uilkraals River Valley, on a sandy limestone kranz (–CB), *F. Brusse 3835*, 1981.05.14 (PRE). 3420 (Bredasdorp): Bredasdorp District near Mierkraal, Die Poort (Heuningsnes River Valley) on a S-facing sandy limestone kranz (–CA), *F. Brusse 3815*, 1981.05.14 (PRE; LD); Cape Agulhas, limestone ridge behind the town, on limestone on steep S slope (–CC), *F. Brusse 3792*, 1981.05.13 (PRE).

F. BRUSSE

RICCIACEAE

PTERORICCIA SCHUST., SHOULD IT BE UPHELD?

The family *Ricciaceae* Dum. is distinguished from other families in the order Marchantiales by the simply constructed sporophyte embedded within the thallus tissue. Until recently it has been generally accepted that the family comprises only two genera: *Ricciocarpus* Corda and *Riccia* (Mich.) L.

Ricciocarpus is monotypic, with the species *R. natans* (L.) Corda, and is separated from *Riccia* by its long pendant scales with serrate margins and the presence of oil cells in the scales and the thallus. *Riccia,* on the other hand, is a large genus, now divided into several subgenera and probably comprises as many as 200 species worldwide.

A third genus, *Pteroriccia,* based on *Riccia villosa* Steph., was recently recognized by Schuster (1984a, 1984b). His decision was made after only examining Arnell's (1963) text and figures, which, by his own admission, are not good. Schuster's reasons for separating this taxon from the other *Riccia* species are as follows:

(a) the distinctive dorsal epithelium of loose, erect cellular 'filaments' ('superficies dorsalis thalli velutina ob filamenta cellulae erecta isolata'); and

(b) the large erect and imbricate ventral scales with serrate margins (Fig. 21.1, 21.2) ('squamae ventrales ingenter, usque ad 1.5 mm long.; erectae (siccatae super thallum incurvatae), apicibus eorum serratis').

According to Schuster, such scales do not occur in any *Riccia* species, but they are found in the aquatic form of *Ricciocarpus natans* (Fig. 21.8), to which there is, however, no close affinity. He is, therefore, of the opinion that this new genus is at least as different from *Riccia* as is *Ricciocarpus,* which is generally recognized as a distinct genus.

The following comments can be made on the characters used by Schuster to separate his new genus:

(a) the epithelium of *R. albomarginata* Bisch. was already described by Sim (1926) as consisting of free 'pillars of long empty cells about five cells deep'. In his key, Arnell (1963) uses the 'velvet-like' dorsal surface 'caused by free cell pillars' as a character for *R. albomarginata* and *R. concava* Bisch. He also refers to the free cell pillars in his description of *R. villosa* although he does not place it in his key with the aforementioned two species. A total of eight southern African species with loose dorsal pillars are now known and are grouped together in the section *Pilifer* Volk (1983).

(b) the scale margins in some southern African *Riccia* species vary from crenate, as in *R. okahandjana* S. Arnell (Fig. 21.3, 21.4) and *R. rhodesiae* S. Arnell (Fig. 21.7), to serrate in *R. villosa,* to having long multi-cellular appendages (Fig. 21.5 & 6) in an undescribed species collected at Victoria West and Springbok and on the Kamiesberg.

CONCLUSION

The loose dorsal 'filaments' are not peculiar to *R. villosa;* furthermore scale margins vary considerably in some species of *Riccia*. Therefore, a species exhibiting the characters mentioned by Schuster need not be placed in a separate genus and it is proposed that *Pteroriccia* be regarded as synonymous with *Riccia*.

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S. M. PEROLD

Bothalia 16,1: 65–69 (1986)

The shape and ultrastructure of the caryopsis of *Pentameris* and *Pseudopentameris* species (Arundinoideae, Poaceae)

N. P. BARKER*

Keywords: caryopsis, leaf anatomy, *Pentameris, Pseudopentameris,* spikelet morphology

ABSTRACT

Pentameris Beauv. and *Pseudopentameris* Conert differ in their leaf anatomy, spikelet morphology and ovary structure. Caryopses of species of both genera were examined under the scanning electron microscope (SEM) and these species are grouped according to caryopsis features. These groups are compared to the groupings suggested by spikelet morphology and leaf anatomy.

INTRODUCTION

1 *Present classification (based largely on spikelet morphology)*

The genera *Pentameris* Beauv. and *Pseudopentameris* Conert are members of the subfamily Arundinoideae, which contains diverse tribes not particularly closely related. Some tribes are included because they do not fit clearly into other subfamilies (Renvoize 1981). Both the genera studied here were formerly treated in the tribe Danthonieae, but are now assigned to the Arundineae.

1.1 Pentameris

This genus, originally created by Palisot de Beauvois (1812), contains five described species. These are *P. longiglumis* (Nees) Steud., *P. macrocalycina* (Steud.) Schweick., *P. dregeana* Stapf, *P. obtusifolia* (Hochst.) Schweick. and *P. thuarii* Beauv. with var. *burchellii* Stapf. There is a further rare undescribed species that belongs to *Pentameris* (if the present generic limits are accepted). This species is referred to below as *Pentameris* sp. nov.

The number of veins in the glumes distinguish *Pentameris* (one or occasionally three) from *Pseudopentameris* (five or more).

1.2 Pseudopentameris

The genus *Pseudopentameris* was described by Conert (1971) as a segregate of *Danthonia* DC. The two species of this genus, *P. macrantha* (Schrad.) Conert and *P. brachyphylla* (Stapf) Conert, were removed from *Danthonia* because they differ conspicuously from the other species in their 2-flowered spikelets which are over 40 mm long. Conert (1971) claims that *Pseudopentameris* can be easily separated from both *Danthonia* and *Pentameris* by the many-nerved glumes, the structure of the caryopsis and the leaf anatomy.

2 *Leaf anatomy*

Ellis (1985a) has examined the leaf anatomy of the above eight species in detail, but his findings on *Pentameris dregeana* have not yet been published.

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2.1 Pentameris

Ellis (1985d) states that *Pentameris macrocalycina, P. obtusifolia* and *P. longiglumis* form a natural group within the present genus boundary. However, *P. thuarii* is quite different in its anatomy from the other species, and is considered by Ellis (1985c) to show similarities to certain species of *Pentaschistis. Pentameris dregeana* was divided by Ellis (pers. comm.) into three forms: a 'typical' form, a 'hairy' or pubescent form and an 'atypical' form. The typical forms may be incorrectly identified specimens, as many of them also show features similar to *Pentaschistis* species. *Pentameris* sp. nov. is similar in its leaf anatomy to the *Pseudopentameris* species, and Ellis (1985b) postulates that the taxon may be of hybrid origin, with *Pentameris longiglumis* and a species of *Pseudopentameris* as parent species.

2.2 Pseudopentameris

Ellis (1985a) considers *Pseudopentameris* to be clearly distinct from other supposedly closely related genera such as *Pentameris* and *Merxmuellera* Conert. He found only slight anatomical differences between the two *Pseudopentameris* species.

3 *Ovary and caryopsis*

Chippendall (1955) and Conert (1971) state that ovary and caryopsis structures are useful in distinguishing between the two genera, but caryopsis shape and coat sculpturing have seldom been used in grass taxonomy.

Pentameris has deciduous hairs on the top of the ovary (Chippendall 1955). The caryopsis, described by Stapf (1899) from *P. thuarii,* is globose-ellipsoid, truncate at the top, and has a linear hilum as long as half the grain or longer.

Pseudopentameris has a glabrous ovary with the stigmatic hairs joined over the top (Chippendall 1955). The caryopsis of *P. macrantha* was described by Stapf (1899) as linear-oblong, and with the hilum longer than half the grain. The genus *Pentaschistis,* which is closely related to *Pentameris* and *Pseudopentameris,* has glabrous ovaries and Stapf (1899) described the grain as oblong, semiterete to subterete with an obscure hilum one quarter to one third the length of the grain.

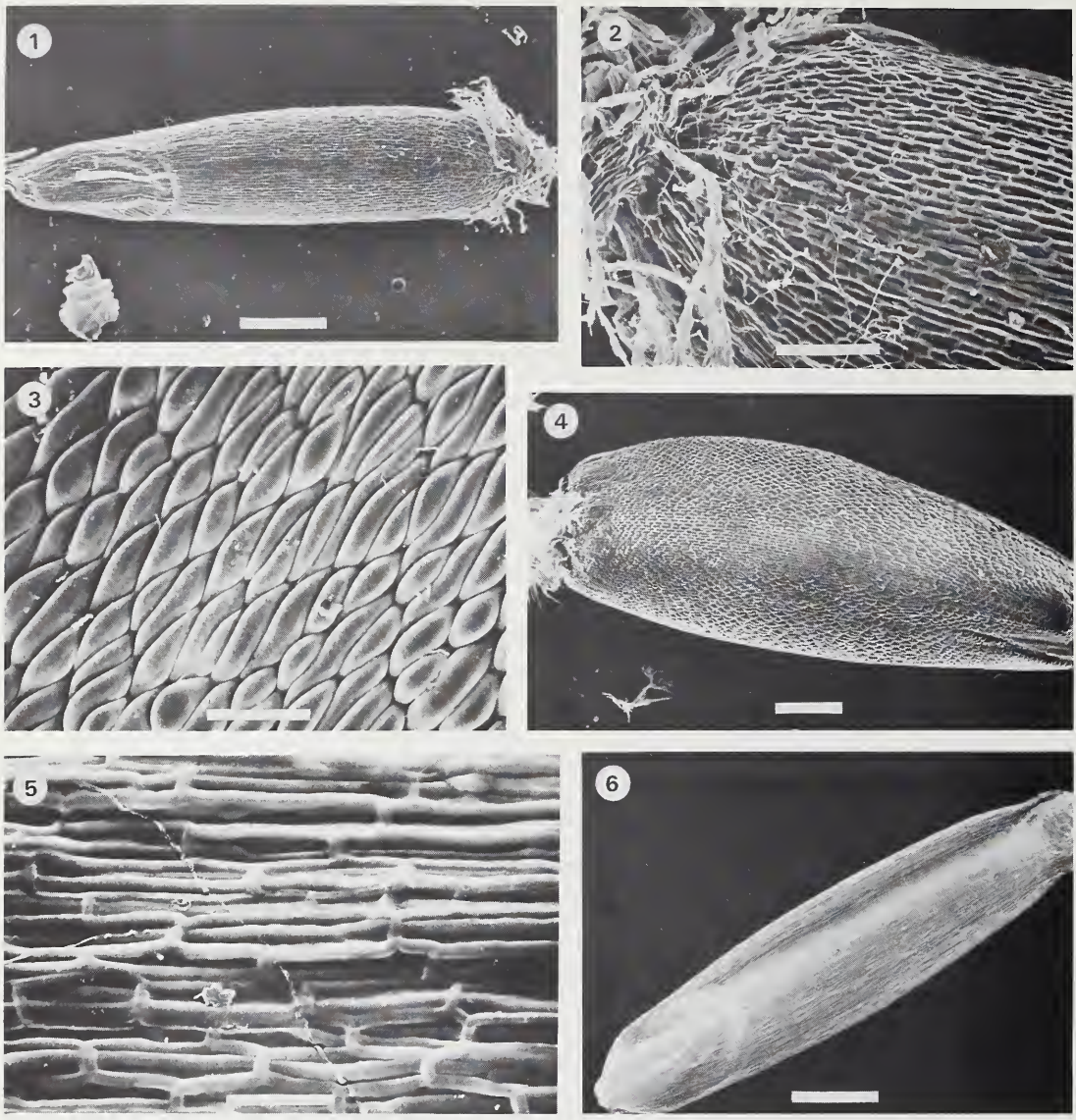

FIG. 1. — 1 & 2, *Pentameris* sp. nov. *(Hilton-Taylor 352)*: 1, whole caryopsis, narrowly elliptic; scale bar = 500 μ; 2, stylar end of the caryopsis showing reticulate sculpturing; scale bar = 200μ. 3 & 4, *P. obtusifolia (Andreae 706)*: 3, close up of colliculate sculpturing; scale bar = 100μ; 4, whole caryopsis, elliptic; scale bar = 500μ. 5 & 6, *Pseudopentameris macrantha (Ellis 2327)*: 5, close up of reticulate sculpturing; scale bar = 50μ; 6, whole caryopsis, narrowly elliptic; scale bar = 1000μ.

The present paper describes the shape of the caryopsis and the coat sculpturing of some of the species, and emphasizes the differences and similarities between the species and the genera. The species are grouped on the basis of these similarities, and this classification is compared to the groupings based on spikelet morphology and to the groups suggested by Ellis (1985a–d) which are based on leaf anatomy.

METHODS AND MATERIAL

Caryopses were obtained from herbarium specimens housed in the National Herbarium, Pretoria (PRE), and were prepared for the SEM. They were mounted on stubs, placed in an Eiko Engineering IB 2 ion coater and coated with gold at a current of 7 micro-amps for 7 minutes. The stubs were examined using an ISI–SX–25 Scanning Electron Microscope. Photomicrographs were taken on Ilford FP4 120 film.

Specimens examined:

Pentameris dregeana

CAPE.—3322 (Oudtshoorn): Prince Albert (–AC), *Bond 1253*.

Pentameris macrocalycina

CAPE.—3419 (Caledon): Hermanus (–AC), *Barker N. P. 64*. 3322 (Oudtshoorn): Blesberg (–BC), *Bond 848*.

Pentameris obtusifolia

CAPE.—3319 (Worcester): Wemmershoek (–CC), *Andreae 706*.

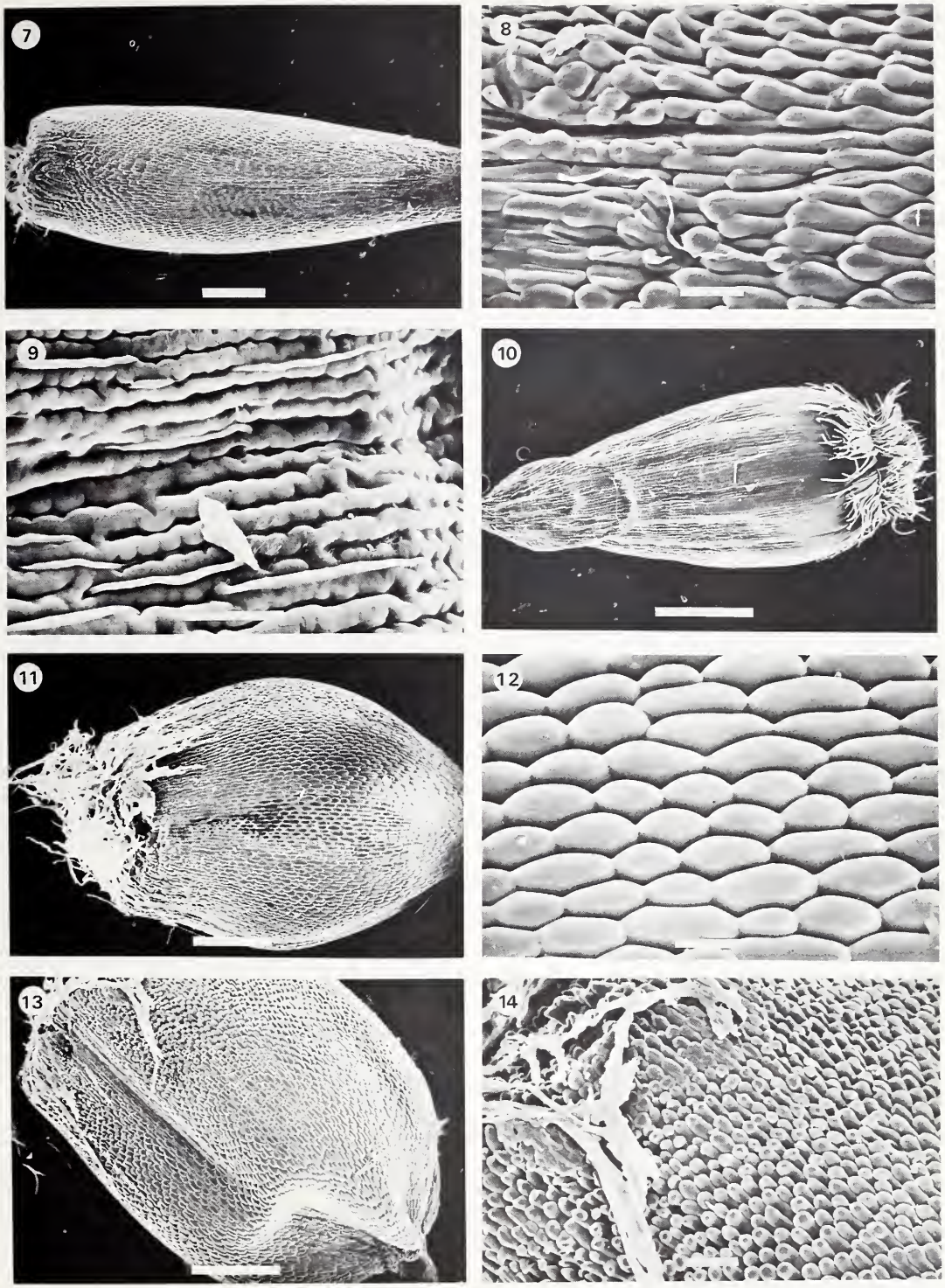

FIG. 2. — 7 & 8, *Pentameris macrocalycina (Bond 848)*: 7, whole caryopsis, elliptic; scale bar = 500μ; 8, colliculate to tuberculate sculpturing near stylar end of caryopsis; scale bar = 50μ. 9 & 10, *P. dregeana (Bond 1253)*: 9, rugose sculpturing at approx. a third of the length from the base; scale bar = 50μ; 10, whole caryopsis, cuneiform; scale bar = 500μ. 11 & 12, *P. thuarii* var. *thuarii (Barker, W. F. 7653)*: 11, whole caryopsis, globose; scale bar = 500μ; 12, colliculate sculpturing of the surface; scale bar = 50μ. 13 & 14, *P. thuarii* var. *burchellii (Van Breda 337)*: 13, whole caryopsis, globose-truncate; scale bar = 500μ; 14, colliculate to tuberculate sculpturing close to stylar end of caryopsis; scale bar = 100μ.

Pentameris thuarii

CAPE.—3322 (Oudtshoorn): Jakkalsvlei, Outeniqua Pass (–CD), *Barker, W. F. 7653.* 3320 (Montagu): Grootvadersbosch (–DD), *Barker, W. F. 8812.*

Pentameris thuarii var. *burchellii*

CAPE.—3319 (Worcester): Brandwagt (–CB), *Van Breda 337.*

Pentameris sp. nov. (sensu Ellis 1985b)

CAPE.—3418 (Simonstown): Kogelberg, Platberg (–DD), *Hilton-Taylor 352.*

Pseudopentameris macrantha

CAPE.—3418 (Simonstown): Cape of Good Hope Nature Reserve (–AD), *Ellis 2327.* 3420 (Bredasdorp): De Hoop Nature Reserve (–AD), *Barker, N. P. 48.*

Note: No caryopsis material of *Pentameris longiglumis* or *Pseudopentameris brachyphylla* was available in PRE.

RESULTS AND DISCUSSION

Caryopsis shape

Three general types of caryopsis shapes occur in the species examined:

1) cuneiform, as shown by *Pentameris dregeana* (Fig. 2.10);

2) globose, as shown by *Pentameris thuarii* (Fig. 2.11 & 13);

3) elliptic to narrowly elliptic, as shown by *Pentameris macrocalycina* (Fig. 2.7), *P. obtusifolia* (Fig. 1.4), *P.* sp. nov. (Fig. 1.1) and *Pseudopentameris macrantha* (Fig. 1.6). These features are summarized in Table 1.

Caryopsis coat sculpturing

Three types of caryopsis coat sculpturing were observed:

1) colliculate sculpturing as shown by *Pentameris macrocalycina* (Fig. 2.8), *P. obtusifolia* (Fig. 1.3) and *P. thuarii* (Fig. 2.12, 2.14).

2) reticulate sculpturing, as found in *Pseudopentameris macrantha* (Fig. 1.5) and *Pentameris* sp. nov. (Fig. 1.2).

3) rugose sculpturing as shown by *Pentameris dregeana* (Fig. 2.9).

Caryopsis hairs

All the *Pentameris* species, including *Pentameris* sp. nov., possessed hairs at the stylar end of the caryopsis. None of the *Pseudopentameris* specimens examined had these hairs. This confirms Chippindall's (1955) observation that only *Pentameris* species possess such hairs.

Pentameris can therefore be separated from *Pseudopentameris* by the presence of hairs on the stylar end of the caryopsis. Within *Pentameris* the species can be grouped on combinations of the other characters observed: *Pentameris macrocalycina* and *P. obtusifolia* agree in general caryopsis shape, and both have a colliculate surface. The surface of *P. macrocalycina,* however, becomes more tuberculate near the stylar end of the caryopsis, as does the surface of *P. thuarii. P. thuarii,* however, differs markedly in caryopsis shape, and should therefore perhaps be separated from this group. *P. dregeana* with its rugose caryopsis sculpturing pattern and cuneiform shape is also different from the other two species of *Pentameris* that were examined.

The caryopsis sculpturing of the only species of *Pseudopentameris* observed is similar to that of *Pentameris* sp. nov., and suggests that the new taxon could be placed in *Pseudopentameris.* However, this is contradicted by the presence of hairs on the stylar end of the caryopsis and the presence of only one vein in the glume, which places this taxon in *Pentameris.*

The generic and subgeneric boundaries for the two genera, according to the groupings based on differing sets of characters, are shown in Fig. 3. Fig. 3a shows the boundaries based largely on floral characters, with particular reference to the number of veins in the glume (one, or occasionally three in *Pentameris,* five or more in *Pseudopentameris*). Fig. 3b shows these boundaries as they may be interpreted from the leaf anatomy data of Ellis (1985a–d and pers. comm.). Fig. 3c shows the boundaries based on the caryopsis morphology. *Pentameris thuarii* and *P. dregeana* are somewhat differently placed in the three classifications. *Pentameris* sp. nov. is treated differently in all three groupings. This may indicate that Ellis's hypothesis of a hybrid origin for the new taxon could be correct.

TABLE 1.—The caryopsis characters of each species examined are shown. Characters of species which were not examined are tentatively indicated by question marks

Species	Shape of caryopsis			Surface of caryopsis			Style hairs	
	Cuneate	Ellipsoid	Globose	Colliculate	Reticulate	Rugose	Joined	Free
Pentameris								
thuarii			x	x				x
dregeana	x					x		x
macrocalycina		x		x				x
obtusifolia		x		x				x
sp. nov.		x			x			x
longiglumis		?		?				?
Pseudopentameris								
macrantha		x			x		x	
brachyphylla		?			?		?	

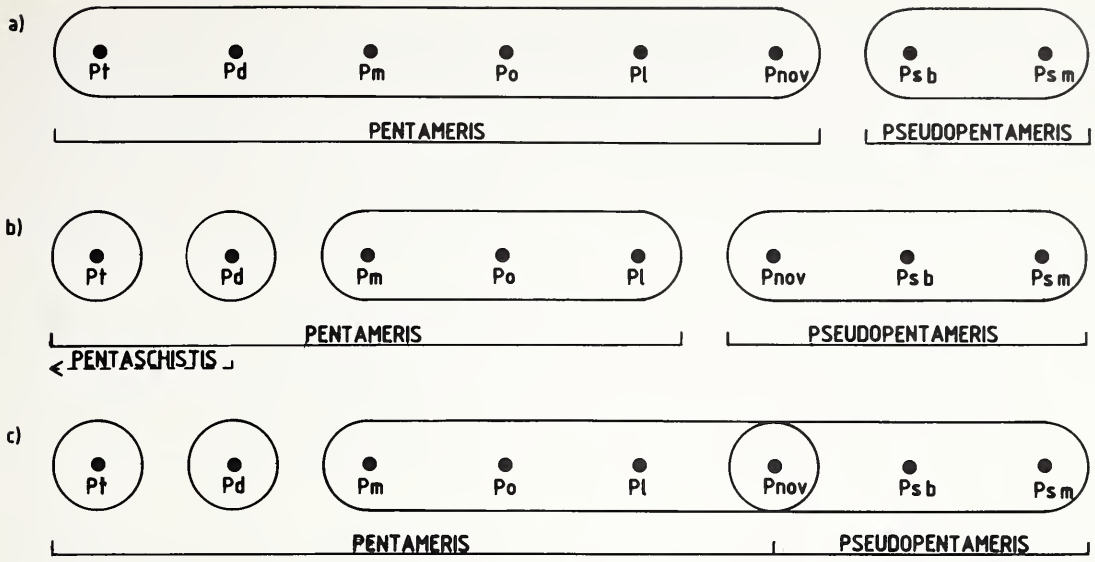

FIG. 3. — The generic and subgeneric boundaries of *Pentameris* and *Pseudopentameris*. The sets indicate possible subgeneric limits, the lines beneath indicating the generic limits. a, presently accepted limits, based largely on floral characters; b, divisions based on leaf anatomy; c, boundaries based on shape and surface features of caryopsis. Note the dubious position of *Pentameris thuarii, P. dregeana* and *P.* sp. nov. Pt, *Pentameris thuarii*; Pd, *P. dregeana*; Pm, *P. macrocalycina*; Po, *P. obtusifolia*; Pl, *P. longiglumis*; Pnov, *P.* sp. nov.; Psb, *Pseudopentameris brachyphylla* and Psm, *P. macrantha*.

Although no caryopsis material was available for *Pentameris longiglumis* or *Pseudopentameris brachyphylla,* it is possible to make predictions about caryopsis structure and shape for these taxa if a correlation between the caryopsis features and leaf anatomy is assumed. Ellis (1985d) states that *Pentameris macrocalycina, P. obtusifolia* and *P. longiglumis* are similar in anatomy, and are not closely related to any other taxon. *P. macrocalycina* and *P. obtusifolia* also show similarities in caryopsis shape and coat sculpturing. It can therefore be predicted that *P. longiglumis* will show similar caryopsis features, namely an elliptic shape and colliculate sculpturing. Similar logic applies to *Pseudopentameris brachyphylla.* The leaf anatomy of this species is very similar to the anatomy of *P. macrantha* and *Pentameris* sp. nov. (Ellis 1985a & b). It can therefore be predicted that the caryopsis of *Pseudopentameris brachyphylla* will be narrowly elliptic, and exhibit reticulate sculpturing. Both predictions are shown in Table 1 as question marks.

CONCLUSION

Caryopsis shape, coat sculpturing and presence of hairs on the stylar end of the caryopsis appear to be important characters in the classification of *Pentameris* and *Pseudopentameris* and may even be of value to the taxonomy of the entire tribe. Caryopsis characters are correlated with leaf anatomy in these two genera.

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UITTREKSEL

Pentameris *Beauv. en* Pseudopentameris *Conert verskil in hulle blaaranatomie, die morfologie van die blompakkies en die struktuur van die vrugbeginsels. Vruggies van spesies van albei genusse is onder die skandeerelektronmikroskoop bestudeer en die spesies is volgens vrugkenmerke in groepe geplaas. Hierdie groepe word vergelyk met groeperings wat op blompakkiemorfologie en blaaranatomie berus.*

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William Keit and the Durban Botanic Garden

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Keywords: biography, Durban Botanic Garden, William Keit

ABSTRACT

William Keit was born in Saxony in 1841 and in early life travelled across Europe working in many famous nurseries and gardens. In 1872 on the recommendation of the director of Kew Gardens, Keit emigrated to Natal to become curator of the Durban Botanic Garden. So dilapidated was this garden that Keit was faced with the task of virtually re-establishing it. Though he was largely successful in this endeavour, as he was in fortifying the link between Natal and Kew, Keit could not solve the problems of a severe drought, a labour shortage and a scarcity of funds. In 1881 he resigned his position leaving a solid foundation on which the renowned botanist, John Medley Wood was to build. Keit in later life ran a successful nursery in Durban and for 30 years was curator of the Parks and Gardens Department, in which capacity he did more than anyone else to beautify Durban.

The early Botanic Garden

In April 1848 the Natal Agricultural and Horticultural Society was founded in Durban with the principal aim of establishing a botanic garden to serve the young colony of Natal (Natal Agricultural and Horticultural Society 1848). It was not until June 1851, however, that a permanent site of some 50 acres on the lower slopes of the Berea was taken over by the Horticultural Society (Durban City Estates Department n.d.). Though in the next 20 years the garden spearheaded crop experimentation and seed distribution, it was never properly developed into a botanic garden. It remained largely virgin bush, unfenced save for a small allotment area.

Because the curator's salary was so low, the Society had difficulty in finding a suitable man for the post. Between 1851 and 1872 there were seven curators (Strey n.d.). The best known and the longest serving of these was a Scot named Mark Johnston McKen who was curator from 1851 to 1853 and again from 1860 to 1872 (*Natal Colonist* 23 April 1872; *Natal Mercury* 25 April 1872). McKen did much for the economic development of Natal but failed to lay out a proper botanic garden. When he died in March 1872, leaving his wife and six children destitute, the Horticultural Society resolved to employ a curator who, unlike McKen, would devote his whole energies to the garden. As they could find no one suitable in the colony they wrote to Sir Joseph Hooker, the director of the Royal Botanic Gardens at Kew, requesting him to recommend a replacement for McKen (*Natal Government Notice* No. 191; 1872). Hooker had recently been impressed by a young German gardener named Julius Wilhelm Keit, or William Keit as he called himself in the English-speaking world, who at the time was employed at the Royal Botanic Gardens, Glasnevin, outside Dublin (Strey 1972; 1974).

Keit's early career

William Keit was born in Dresden in the state of Saxony on 1 May 1841. He was the son of a master soap-maker (Pers. comm.: Frl. Klara Keit, Mannheim, W. Germany). His father died when he was young and Keit inherited a small sum which was administered until he came of age by his uncle and guardian, Hermann Steinmetz. As a young man, Keit led a somewhat carefree if lonely life. Having been sacked from his first job, he moved across Europe working in gardens and nurseries in Munich, Basle, possibly Paris, in Linden's nursery in Brussels, the Exhibition Palace winter gardens in Dublin and in the gardens of Blyth Hall in Nottinghamshire, England. Finally, in June 1868, he was appointed to Glasnevin (Keit n.d.(a)).

Though Keit considered Dublin the dirtiest city he had ever seen, he was fond of Glasnevin and had a great respect for its director, Dr David Moore. In September 1869 he accompanied Moore's two children to a boarding school in Hanover. By 1872 Keit

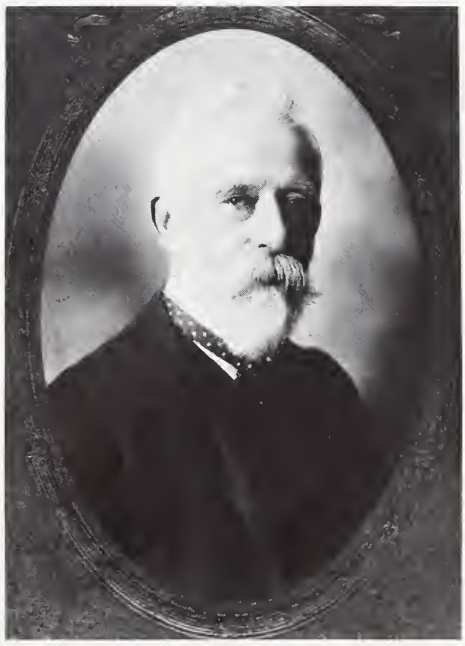

FIG. 1. — William Keit.

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was foreman-in-charge of the propagating houses at Glasnevin (Keit 1867–1869).

When Sir Joseph Hooker received the request from Natal he wrote to Moore asking him his opinion of Keit's suitability for the job. In his reply Moore described Keit as 'an excellent practical gardener and very ingenious at applying various methods for propagating plants' (Moore 1872). A few days later Keit wrote to Hooker expressing his willingness to take the Natal post (Keit 1872a). Hooker duly appointed him.

Six years previously, Keit's cousin Heinrich Hoehne had emigrated to the Cape and Keit had greatly envied him this experience (Keit 1866). Now on 8 September 1872 Keit wrote home excitedly, 'The job in Natal is, according to all accounts, very challenging and I hope I will do justice to it.'

Keit at the Durban Botanic Garden

Keit left Dublin on 25 September 1872, travelled to see his family in Dresden where he collected a small proportion of his legacy, and returned to England to take ship for South Africa. Hooker presented him with a Wardian case of plants to take to his new garden. Unfortunately, the glass panels on the side of the case were broken on what proved a traumatic voyage and the plants suffered badly. Keit arrived in Natal on 14 December and settled into a 'pretty house' at the foot of the Berea beside the garden. He officially started work on 1 January 1873.

He hid from his benefactor, Dr Moore, his disappointment at the terrible state of the garden and wrote of the great heat, and the beauty of the bougainvillea in full bloom on Christmas day. To Hooker and to his family he was more candid and spoke of his concern about the neglect of the grounds. The garden did have a small and practically empty greenhouse, which had been erected in 1870, and two summer-houses which afforded panoramic views of the town, the bay and the sea. There was little else to commend the garden. Most of the paths had been washed away and not rebuilt, and what few flowerbeds existed were overgrown. Worse still, in Keit's eyes, was the fact that there was 'no systematic arrangement, the plants having been planted where there was space and, what I regret most, there are no names on them.' He observed, 'it will take me a long time and all my energies to bring something like order in this place and to rename the plants' (Keit 1872b; 1873a; 1873b).

Sir Joseph Hooker soon realized the impossible position Keit was in and offered to try and find him another position elsewhere (Keit 1874). But by then Keit had become engaged to Louisa Currie, the daughter of a prominent Durban citizen and future mayor of the town. The couple were married on 9 September 1874 and were to have eight children. Though this marriage served to hold Keit in Natal he did not dismiss the possibility of emigrating once again. In September 1875 he appealed to Hooker, 'should I fail then I trust you will not forsake me' (Keit 1875).

William Keit did much for the Durban Botanic Garden. By 1874 he had increased the area under cultivation from approximately 4½ to 9 ha. He fenced the lower part of the garden, laid out flowerbeds, rebuilt the paths, sowed grass on the banks to prevent soil erosion and persuaded the town sanitary department to give him large quantities of manure to improve the quality of the rather poor red soil. He established a proper nursery in 1875 and two years later a pinetum which contained 29 varieties of conifer. He also experimented with wood, zinc and cast-iron labels to see which could best withstand the destructive combination of white ants and weather. In his annual curator's report for 1877 Keit noted: 'In the absence of any systematic arrangement of plants in the Gardens, it has been my aim, when making fresh plantations to plant individuals of the same order in groups, having regard to effect and situation.'

By the end of 1875 the garden contained 670 plant species. Keit's own interests lay in sea algae, palms, of which he grew 10 species, and cycads. He listed the cycads in his garden as: *Cycas media, Encephalartos altensteinii, E. caffra, E. ghellincki, E. hildebrandtii, E. natalensis, E. villosus* and *Macrozamia tenuifolia* (Durban Botanic Garden 1873–1880).

Before he left Glasnevin Keit had written to Hooker: 'My botanical knowledge is more general than particular. I can arrange plants botanically after knowing their names, but I could not undertake to know or describe new plants scientifically.' In the Durban Botanic Garden Keit's taxonomic knowledge increased. Many years after he had resigned the curatorship, it gave Keit quiet satisfaction to see that a plant which he had correctly identified was incorrectly identified by his eminent successor, John Medley Wood (Keit n.d. (b)). Before he died in 1875, the naturalist Thomas Baines was in occasional contact with Keit (1873c).

Two problems which seriously affected Keit in his botanical studies were weak eyesight and the lack of a microscope. None the less he has the credit for publicizing *Agapanthus campanulatus 'mooreanus'* a dwarf flower sometimes referred to as Keit's blue lily. Another lily which carries his name is *Littonia modesta* var. *keitii* (Nelson 1984).

The role of the Durban Botanic Garden as an experimental station for various crops continued under Keit. He made full use of his new nursery. By the mid-1870's it contained: arrowroot, breadfruit, chillies, china grass, the quinine-yielding plant *Cinchona succirubra,* clove, cocoa, ginger, groundnut, indigo, khus khus, lemon grass, maize, mulberry, New Zealand flax, nutmeg, prickly comfrey, sorrel, tomatoes, turmeric, vines and yams. In addition, Keit experimented with several plantation crops. He brought in new varieties of coffee, sugar cane, tea and tobacco from Kew and distributed the seed to planters. New strains of sugar cane were especially in demand and although it was not Keit who introduced the famous uba cane he did introduce 60 new varieties into Natal from Kew and Mauritius. He also did much to encourage the growing of sugar cane. Two exotics with which Keit experimented were the opium poppy, *Papaver somniferum,* and the rubber plants, *Ceara* and *Hevea braziliensis* (McCracken 1985).

Unfortunately many of the plantation species Keit promoted proved unsuitable for the Natal climate, being susceptible to disease or parasites, or too exotic in the eyes of the planters. It was in the distributing of trees that Keit made his greatest contribution. By 1877 the demand for forest trees in Natal was very great. Keit observed that even on the coast, trees were becoming more scarce and valuable every year. For firewood he recommended the planting of the silver oak, *Grevillea robusta* (Durban Botanic Garden 1877). He provided these on request; he also provided over 10 000 plants of *Eucalyptus globulus* which were planted in an around Durban. These were especially used to reclaim swampy ground near the town.

In a period of seven years Keit was to distribute locally over 25 000 plants and 2 000 packets of seed. In this undertaking he was assisted by the Natal Government Railway Company which carried the packages from the botanic garden free of charge. Keit was disappointed in the lack of economic progress in the colony. He once wrote: 'Natal is a strange place. Everything under the sun grows here except rare tropical plants and plants from cold countries. Even so we have no industry which is indigenous, and so hardly anything is fully utilized' (Keit 1887).

As well as distributing plants and seeds within the colony Keit sent Wardian cases of indigenous Natal plants overseas, often using the official government mail bag for smaller packages. He despatched upwards of 40 Wardian cases and packages a year. He exchanged plants with the botanic gardens at Adelaide, Brussels, Calcutta, Cape Town, Glasnevin (Dublin), Grahamstown, Hamburg, Howrah, Kew, Lucknow, Madras, Melbourne, Pamplemousses (Mauritius), Pretoria and Sydney. In addition, Keit exchanged plants with five other botanical or horticultural societies and 19 nurseries or individuals overseas. One Wardian case of *Encephalartos natalensis* which he sent to Adelaide suprisingly survived one and a half years in a bonded store in Melbourne and was nearly three years in a dormant state before being planted out.

Problems facing Keit

Despite the sterling efforts of Keit in establishing a proper botanic garden in Durban and in winning international recognition for it, there were fundamental problems over which he had no control and which from 1876 onwards gradually undermined his work. The first of these was drought. The annual rainfall, which in 1875 had been 1 372 mm, decreased to 889 mm in 1876, and stayed at this level for 1877, before plummeting to a meagre 771 mm in 1878. With only a 13,6 hl water tank in the garden and all the watering having to be done with buckets, many plants, especially conifers and palms, soon died (Durban Botanic Garden 1878).

The second problem facing Keit was one generally experienced in Natal, that of a shortage of labour. Until 1877 he had the use of six short-sentence convicts to augment his African labour-force which fluctuated from four to seven in total. After 1877 he had the use of only three convicts, with the result that in 1879 when his African labourers left because of the Anglo-Zulu war he began employing Indian labour. So drastic was his labour crisis that Keit was often forced to do heavy manual labour himself to keep the large area of the garden under control. Though between 1875 and 1879 he had the assistance of a young German named Paul Hansch, Keit was tied to the garden by the necessity of taking twice-daily readings of the government meteorological instruments which had been installed in the garden in February 1873. As a result, Keit was prevented from going on plant-collecting expeditions which meant he had to rely on the public and on his African staff to collect on his behalf. This made him very depressed. As early as September 1873 he sent a cycad cone to Kew apologizing that he had nothing else: 'Our garden,' he explained, 'yields nothing you might care to have' (Keit 1873d).

Yet another problem facing Keit was that of the financial viability of the garden. Income rarely exceeded £450 per annum, the government grant being £350. Public subscriptions to the garden declined from £62 in 1873 to a mere £17 in 1877 due mainly to the fact that Keit became increasingly embarrassed about demanding money as he had few exotics to give subscribers in return for their subscriptions. Sales of plants in the same period, however, rose from £6 to £92 and would have been even greater had Keit been able to explore Natal and Zululand for plants. As far as expenditure was concerned, wages, rations and his own salary of £150 accounted for over 70 %. Money spent on building and maintenance rarely rose above £50 or 11 % of expenditure.

This fatal combination of drought, labour shortage and lack of funds seriously affected the garden. By 1880, due to lack of maintenance, the greenhouse and summer-houses had collapsed. Even the garden seats were dangerous to sit on because they were so ant-eaten. The previous year Mary Elizabeth Barber visited the Durban Botanic Garden. She wrote afterwards: 'The gardens are "out of sight and out of mind"; no one appears to either think or care about them; they have a weedy and neglected appearance. The conservatory was empty . . . In a pond we suddenly came upon that superb Indian water lily *(Nymphaea rubra).* It was growing side by side with our own lovely blue water lily *(Nymphaea stellata),* and a very handsome contrast they formed; the Curator (Keit) very kindly gathered us a bunch of the former; I begged him not to pick so many, he declared that we were only too welcome to them, that no one ever came to look at them in that solitary place. We took them down to the town, where they were much admired by people who told us that they had no idea that they were growing there' (Barber 1963).

The work done by Keit in saving the garden was ignored by the public who increasingly made him the scapegoat for the inadequacies of the by now near-moribund Horticultural Society. Keit could have gained popular support by turning the garden into a pleasure park but he refused to do this. The fact that Keit was foreign and was careful to register at least some of his children as German citizens did not en-

dear him to some of his fellow townsfolk. Others found his quiet manner and firm personality objectionable. His successor was later to describe Keit as 'peculiar' (Wood 1882).

At the end of 1881 following a re-organisation of the horticultural society Keit resigned as curator. Writing to his cousin he merely commented: 'I could not come to terms with the rules of the new Garden's administration' (Keit 1881).

Keit's later career

William Keit did not pass into obscurity in 1881. In 1876 he had bought a 2 ha plot adjacent to Berea Road. On this ground he built a home. With money left by his father-in-law he was also able to establish a nursery and small dairy there. He traded with overseas nurseries and, in particular, supplied large quantities of ferns of the genus *Polystichum* to Germany. In 1883 he was appointed curator of Durban's parks and gardens at a salary of £10 a month. With a small labour-force, one mule and a lawnmower he set about beautifying the town. He planted many trees in the streets, bamboos along Berea Road and palms along the Victoria Embankment Esplanade (Henderson 1904). His greatest achievement was properly laying out and planting Albert, Bulwer and Victoria Parks in the years between 1883 and 1885. He also established a municipal nursery at Congella.

He died on 27 August 1916 when the First World War was at its height and anti-German feeling was prevalent in Natal (Bruss 1981). Nonetheless, Keit's contribution to Durban was not forgotten later, and a new road through his former property connecting Berea and Moore roads was named Keits Avenue.

Keit's legacy

Keit's successor was a local naturalist and farmer called John Medley Wood. Wood greatly benefited from the dissolution of the old Horticultural Society in 1883 and the establishment of a new Botanic Society to run the garden (Natal Colony 1883). He also benefited from additional government money which facilitated the employment of a Kew-trained gardener called James Wylie, and the establishment of an herbarium (Schrire 1983). The construction of a 50 000 gallon reservoir by the Town Council in the grounds of the garden further eased the problems facing the Durban curator.

By the 1890s Wood, who was an excellent taxonomist, had developed the Durban Garden into the finest botanic garden in Africa. But his success was built on the foundations laid by Keit. Despite their dilapidated state, in 1881 Wood inherited a garden which was properly laid out and labelled, and which contained a large collection of plant species. Wood also inherited the goodwill which the senior staff at Kew had borne towards Keit; for the next 33 years Wood carried on a fruitful correspondence and exchange of plants with them.

Even after Keit's departure from the garden, Kew stood by him and defended him against attack (Wood 1882). In the nine years that Keit had been curator of the Durban Botanic Garden they could see no evidence to contradict the assessment of him made by Dr Moore of Glasnevin: 'I have never known a man whose moral conduct stood higher in every respect than his does, besides he is a shrewd, sensible man' (Moore 1872). Keit was a consistent man. Seventeen years earlier his employer in Basle had commented in a reference for him: 'I was impressed by his modesty and politeness and his exemplary loyalty to his profession' (Keit 1864).

UITTREKSEL

William Keit is in 1841 in Sakse/Duitsland gebore. In sy jong dae het hy deur Europa gereis en in talle bekende kwekerye gewerk. In 1872 het hy, op aanbeveling van die direkteur van Kew Gardens, na Natal geëmigreer om kurator van die Durbanse Botaniese Tuin te word. Die tuin was so vervalle dat Keit dit feitlik van die grond af weer moes opbou. Alhoewel hy grootliks in hierdie poging geslaag het, asook in die versterking van bande tussen Natal en Kew, kon hy nie die probleme van 'n ernstige droogte, 'n arbeidstekort en 'n tekort aan fondse oorkom nie. Toe hy in 1881 uit sy pos bedank het, het hy 'n stewige fondament nagelaat waarop die beroemde plantkundige John Medley Wood voortgebou het. Later het Keit 'n suksesvolle kwekery in Durban bedryf en 30 jaar lank was hy kurator van die Parke- en Tuinedepartement. In hierdie hoedanigheid het hy meer gedoen as enigiemand anders om die stad Durban te verfraai.

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The plant ecology of the farm Groothoek, Thabazimbi District. III. An annotated checklist

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Keywords: checklist, growth forms, savanna, utilization classes, vegetation

ABSTRACT

A checklist of 332 plant species representing 226 genera and 84 families is given for the farm Groothoek, Thabazimbi District, Transvaal. The annotations are growth form, utilization class and voucher specimen.

INTRODUCTION

The plant ecology of the farm Groothoek, which covers 4 000 ha in the Thabazimbi District, was studied in order to supply data on the Sour Bushveld (Acocks 1975) for the natural resource inventory of the Department of Agriculture and Water Supply. This veld type is found mainly in the Waterberg of the Transvaal and little is known about it.

A phytosociological classification of the vegetation in a separate publication (Westfall *et al.* 1985) describes the habitats of most of the plant species and these are therefore not repeated here. The checklist serves as a permanent record of the various plant species encountered during the study, and the utilization class annotations are a preliminary classification of plant species response to management in the study area.

STUDY AREA

The study area has been described in a companion paper (Westfall *et al.* 1985).

METHODS

A reconnaissance of the study area was undertaken from October to December 1979 to carry out ground control of aerial photograph interpretation and to become familiar with the terrain, vegetation and plant species. Fertile herbarium specimens were collected during this period. Sampling of the vegetation began in January 1980 and was completed in May of the same year. Species collected were numbered and later identified by the staff of the National Herbarium. The specimens are housed in the National Herbarium (PRE) of the Botanical Research Institute, Pretoria.

Nomenclature and arrangement follow Gibbs Russell *et al.* (1984). Collecting numbers (all by R. H. Westfall) are indicated in parentheses. All plant names mentioned in Westfall *et al.* (1985) are reflected in this list, even in cases where nomenclature or taxonomy have since been changed. Taxa without collecting numbers represent sight records.

Utilization class annotations are according to Foran *et al.* (1978):

1) Decreaser species — those with a high basal cover in veld which is in good condition. When veld deteriorates, the basal cover of these species decreases.

2) Increaser I species — those with a low basal cover in veld which is in good condition. When veld is under-utilized, the basal cover of these species increases.

3) Increaser II species — those with a low basal cover in veld which is in good condition. When veld is over-utilized, the basal cover of these species increases.

4) Increaser III species — those with a low basal cover in veld which is in good condition. When veld is selectively utilized, the basal cover of these species increases.

The classification of the plant species into the utilization classes is based on the experience of G. du Plooy, Extension Officer, Department of Agriculture and Water Supply, Thabazimbi (pers. comm.) as well as experience gained during field work. The classification is preliminary and subject to modification as more experience is gained.

RESULTS

A total of 332 plant species representing 226 genera and 84 families, was recorded in the study area (Table 1). An analysis of Table 1 shows that six families (7,14% of the total number of families) belong to Pteridophyta, two families (2,38%) to Gymnospermae, eight families (10,71%) to Monocotyledones and 67 families (79,77%) to Dicotyledones. The Poaceae with 30 genera (13,22% of all genera) and 50 species (15,02% of all species) is the largest family in the study area.

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TABLE 1.—Plant families recorded on the farm Groothoek, Thabazimbi District, showing number of genera and species recorded in each family

Family	Genera	Species
PTERIDOPHYTA		
Selaginellaceae	1	1
Schizaeaceae	1	1
Cyatheaceae	1	1
Dennstaedtiaceae	1	1
Adiantaceae	2	3
Aspleniaceae	1	1
GYMNOSPERMAE		
Podocarpaceae	1	1
Cupressaceae	1	1
ANGIOSPERMAE		
Monocotyledones		
Poaceae	30	49
Cyperaceae	6	13
Xyridaceae	1	1
Commelinaceae	2	4
Liliaceae	6	10
Amaryllidaceae	2	2
Hypoxidaceae	1	3
Velloziaceae	1	1
Iridaceae	3	3
Dicotyledones		
Ulmaceae	1	1
Moraceae	1	3
Proteaceae	2	4
Loranthaceae	1	1
Santalaceae	2	2
Olacaceae	1	1
Amaranthaceae	4	5
Aizoaceae	2	2
Portulacaceae	2	2
Caryophyllaceae	1	1
Ranunculaceae	2	2
Annonaceae	1	1
Capparaceae	1	1
Crassulaceae	1	1
Pittosporaceae	1	1
Myrothamnaceae	1	1
Rosaceae	1	1
Fabaceae		
Subfamily Mimosoideae	2	5
Caesalpinioideae	2	2
Papilionoideae	14	23
Oxalidaceae	1	1
Erythroxylaceae	1	1
Rutaceae	2	2
Simaroubaceae	1	1
Malpighiaceae	1	1
Polygalaceae	1	3
Euphorbiaceae	6	8
Buxaceae	1	1
Anacardiaceae	3	7
Celastraceae	2	4
Icacinaceae	1	1
Sapindaceae	1	1
Rhamnaceae	1	1
Vitaceae	1	2
Tiliaceae	2	5
Malvaceae	1	1
Sterculiaceae	3	3
Ochnaceae	1	1
Clusiaceae	1	2
Elatinaceae	1	1
Cactaceae	1	1
Thymelaeaceae	2	2
Combretaceae	2	5
Myrtaceae	2	2
Melastomataceae	1	1
Araliaceae	1	2
Apiaceae	1	1
Myrsinaceae	1	1
Sapotaceae	2	2
Ebenaceae	2	5
Oleaceae	3	3
Loganiaceae	3	5
Gentianaceae	1	1
Apocynaceae	3	3
Periplocaceae	1	1
Asclepiadaceae	3	5
Convolvulaceae	1	1
Boraginaceae	1	1
Verbenaceae	4	5
Lamiaceae	4	7
Solanaceae	1	3
Scrophulariaceae	2	2
Selaginaceae	2	3
Acanthaceae	6	6
Rubiaceae	14	16
Dipsacaceae	1	1
Campanulaceae	2	3
Lobeliaceae	1	2
Asteraceae	22	39
Totals	226	332

CHECKLIST

PTERIDOPHYTA

Selaginellaceae
Selaginella dregei *(C. Presl) Hieron.*

Schizaeaceae
Mohria caffrorum *(L.) Desv.*; Increaser I.

Cyatheaceae
Cyathea dregei *Kunze* (*Alsophila dregei* (Kunze) Tryon); Increaser I (1 018).

Dennstaedtiaceae
Pteridium aquilinum *(L.) Kuhn*; Increaser I.

Adiantaceae
Cheilanthes hirta *Swartz*; Increaser I (905, 1 004).
Cheilanthes viridis *(Forssk.) Swartz* (*Pellaea viridis* (Forssk.) Prantl var. *glauca* (Sim) Sim); Increaser I (1 002).
Pellaea calomelanos *(Swartz) Link*; Increaser I.

Aspleniaceae
Asplenium splendens *Kunze*; Increaser I (945).

GYMNOSPERMAE

Podocarpaceae
Podocarpus latifolius *(Thunb.) R. Br. ex Mirb.*; tree; Increaser I.

Cupressaceae
Widdringtonia nodiflora *(L.) Powrie*; shrub; Increaser I (926).

ANGIOSPERMAE

Monocotyledones

Poaceae
Urelytrum agropyroides *(Hack.) Hack.* (*U. squarrosum* Hack.); Increaser II.
Elionurus muticus *(Spreng.) Kunth*; Increaser III.
Miscanthus junceus *(Stapf) Gibbs Russell* (*Miscanthidium junceum* (Stapf) Stapf); not recorded in sample quadrats; Increaser I (1 006).
Schizachyrium sanguineum *(Retz.) Alston*; Increaser II.
Andropogon appendiculatus *Nees*; Increaser II (821).
Andropogon schirensis *A. Rich.*; Increaser II (913).
Cymbopogon excavatus *(Hochst.) Stapf ex Burtt Davy*; Increaser I.
Cymbopogon validus *(Stapf) Stapf ex Burtt Davy*; Increaser II (901, 924, 1 021).
Cymbopogon sp. (817).
Hyparrhenia hirta *(L.) Stapf*; Increaser II (818).
Monocymbium ceresiiforme *(Nees) Stapf*; Decreaser (830).
Trachypogon spicatus *(L. f.) Kuntze*; Increaser I (917).
Heteropogon contortus *(L.) Roem. & Schult.*; Decreaser.
Diheteropogon amplectens *(Nees) Clayton*; Increaser II.

Themeda triandra *Forssk.*; Decreaser.
Digitaria diagonalis *(Nees) Stapf*; Increaser II (982).
Digitaria eriantha *Steud.* 'subsp. eriantha'; Decreaser (499).
Digitaria eriantha *Steud.* 'subsp. transvaalensis'; Decreaser (876).
Digitaria monodactyla *(Nees) Stapf*; Increaser II (955).
Alloteropsis semialata *(R. Br.) Hitchc.*; Increaser I (819).
Brachiaria nigropedata *(Munro) Stapf*; Decreaser (878).
Paspalum scrobiculatum *L.*; Decreaser (838).
Panicum maximum *Jacq.*; Decreaser.
Panicum natalense *Hochst.*; Decreaser.
Setaria lindenbergiana *(Nees) Stapf*; Decreaser (981).
Setaria megaphylla *(Steud.) Dur. & Schinz*; Decreaser (993).
Setaria sphacelata *(Schumach.) Moss* var. sphacelata (*S. perennis* Hack.); Decreaser (837, 1 026, 1 040).
Rhynchelytrum nerviglume *(Franch.) Chiov.* (*R. setifolium* (Stapf) Chiov.); Decreaser.
Rhynchelytrum repens *(Willd.) C.E. Hubb.*; Decreaser.
Tristachya biseriata *Stapf*; Increaser II.
Tristachya rehmannii *Hack.*; Increaser II (849).
Loudetia simplex *(Nees) C.E. Hubb.*; Increaser III (912).
Aristida aequiglumis *Hack.*; Increaser II (859).
Aristida canescens *Henr.*; Increaser II (954).
Aristida diffusa *Trin.* subsp. burkei *(Stapf) Meld.*; Increaser II (974).
Aristida junciformis *Trin. & Rupr.* subsp. junciformis; Increaser II (820, 956).
Perotis patens *Gand.*; Increaser II.
Sporobolus africanus *(Poir.) Robyns & Tournay*; Decreaser (1 044).
Eragrostis capensis *(Thunb.) Trin.*; Decreaser (827).
Eragrostis curvula *(Schrad.) Nees*; Increaser II (880).
Eragrostis gummiflua *Nees*; Increaser II (835).
Eragrostis lappula *Nees* var. divaricata *Stapf*; Increaser II (822).
Eragrostis pallens *Hack.*; Increaser II.
Eragrostis racemosa *(Thunb.) Steud.*; Increaser II.
Microchloa caffra *Nees*; Increaser II.
Cynodon dactylon *(L.) Pers.*; Increaser II (961).
Pogonarthria squarrosa *(Roem. & Schult.) Pilg.*; Increaser II.
Trichoneura grandiglumis *(Nees) Ekman*; Increaser II.
Enneapogon pretoriensis *Stent*; Increaser II (975).

Cyperaceae
Cyperus albostriatus *Schrad.*; sedge; Increaser II (949).
Cyperus denudatus *L. f.*; sedge; Increaser II (812).
Cyperus leptocladus *Kunth*; sedge; Increaser II (894).
Cyperus margaritaceus *Vahl*; sedge; Increaser II (888).
Cyperus obtusiflorus *Vahl*; sedge; not recorded in sample quadrats; Increaser II (782).
Cyperus rupestris *Kunth*; sedge; Increaser II (775).
Cyperus sphaerospermus *Schrad.*; sedge; not recorded in sample quadrats; Increaser II (761).
Mariscus rehmannianus *C.B. Cl.*; sedge; Increaser II (497).
Bulbostylis boeckeleriana *(Schweinf.) Beetle*; sedge; Increaser II (811).
Bulbostylis burchellii *(Fical. & Hiern) C.B. Cl.*; sedge; Increaser II (842).
Rhynchospora brownii *Roem. & Schult.* (*R. rugosa* (Vahl) Gate); sedge; not recorded in sample quadrats; Increaser II (762).
Coleochloa setifera *(Ridley) Gilly*; sedge; Increaser II (904).
Carex spicato-paniculata *C.B. Cl.*; sedge; Increaser II (952, 1 019).

Xyridaceae
Xyris congensis *Buettn.*; forb; not recorded in sample quadrats; Increaser II (773).

Commelinaceae
Commelina africana *L.* var. lancispatha *C.B. Cl.*; forb; Increaser II (931, 967).
Commelina erecta *L.*; forb; Increaser II (530).
Commelina undulata *R. Br.*; forb; not recorded in sample quadrats; Increaser II (789).
Cyanotis pachyrrhiza *Oberm.*; forb; not recorded in sample quadrats; Increaser II (774).

Liliaceae
Littonia modesta *Hook.*; geophyte; Increaser II (887).
Anthericum galpinii *Bak.* var. norlindhii *(Weim.) Oberm.*; geophyte; Increaser II (1 013).
Eriospermum sp.; geophyte; Increaser II (857).
Aloe transvaalensis *Kuntze*; succulent; Increaser II.
Scilla nervosa *(Burch.) Jessop*; geophyte; Increaser II (941).
Protasparagus buchananii *(Bak.) Oberm.* (*Asparagus buchananii* Bak.); suffrutex; Increaser II.
Protasparagus setaceus *(Kunth) Oberm.* (*Asparagus setaceus* Kunth); suffrutex; Increaser II (1 048).
Protasparagus suaveolens *(Burch.) Oberm.* (*Asparagus suaveolens* Burch.); suffrutex; Increaser II.
Protasparagus virgatus *(Bak.) Oberm.* (*Asparagus virgatus* Bak.); climber; Increaser II (950).
Myrsiphyllum asparagoides *(L.) Willd.* (*Asparagus asparagoides* (L.) Wight); climber; Increaser II (1 008).

Amaryllidaceae
Scadoxus puniceus *(L.) Friis & Nordal*; geophyte; not recorded in sample quadrats; Increaser II (755).
Brunsvigia sp., cf. B. radulosa *Herb.*; geophyte; Increaser II (927).

Hypoxidaceae
Hypoxis angustifolia *Lam.*; geophyte; Increaser II (723).
Hypoxis obtusa *Burch.*; geophyte; Increaser II (851).
Hypoxis rigidula *Bak.*; geophyte; Increaser II (863, 1 028).

Velloziaceae
Xerophyta retinervis *Bak.*; forb; Increaser II.

Iridaceae
Aristea woodii *N.E. Br.*; geophyte; Increaser II (939).
Tritonia nelsonii *Bak.*; shrub; Increaser II (983).
Babiana hypogea *Burch.*; geophyte; Increaser II (1 039).

Dicotyledones

Ulmaceae
Celtis africana *Burm. f.*; tree; Increaser I.

Moraceae
Ficus ingens *(Miq.) Miq.*; tree; Increaser I.
Ficus sur *Forssk.* (*F. capensis* Thunb.); tree; Increaser I (713).
Ficus thonningii *Blume* (*F. burkei* (Miq.) Miq.); tree; Increaser II (1 058).

Proteaceae
Faurea saligna *Harv.*; tree; Increaser II (770).
Protea caffra *Meisn.*; tree or shrub; Increaser II.
Protea gaguedi *J.F. Gmel.*; shrub; Increaser II.
Protea roupelliae *Meisn.*; tree or shrub; Increaser II.

Loranthaceae
Tapinanthus natalitius *(Meisn.) Danser* subsp. zeyheri *(Harv.) Wiens*; parasitic shrub; not recorded in sample quadrats (715).

Santalaceae
Osyris lanceolata *Hochst. & Steud.*; shrub; Increaser I & II (1 066).
Thesium racemosum *Bernh.*; forb; Increaser II (836).

Olacaceae
Ximenia americana *L.*; shrub; not recorded in sample quadrats; Increaser I & II (793).

Amaranthaceae
Kyphocarpa angustifolia *(Moq.) Lopr.* (*Cyphocarpa angustifolia* Lopr.); forb; Increaser II (893, 979).
Cyathula cylindrica *Moq.*; forb; Increaser II (1 007).
Achyranthes aspera *L.*; forb; Increaser II (786).
Achyranthes sicula *(L.) All.*; forb; Increaser II (1 016).
Brayulinea densa *(Willd.) Small*; forb; Increaser II (962).

Aizoaceae
Limeum viscosum *(Gay) Fenzl* subsp. viscosum var. glomeratum *(Eckl. & Zeyh.) Friedr.*; forb; Increaser II (882).
Psammotropha mucronata *(Thunb.) Fenzl* var. mucronata; forb; Increaser II (930).

Portulacaceae
Talinum caffrum *(Thunb.) Eckl. & Zeyh.*; forb; Increaser II (490).
Portulaca kermesina *N.E. Br.*; forb; Increaser II (911).

Caryophyllaceae
Dianthus mooiensis *I. Williams* subsp. kirkii *(Burtt Davy) Hooper*; forb; Increaser II (779).

Ranunculaceae
Clematis sp.; climber; Increaser II (1 042).
Clematopsis scabiosifolia *(DC.) Hutch.*; forb; not recorded in sample quadrats; Increaser II (790).

Annonaceae
Hexalobus monopetalus *(A. Rich.) Engl. & Diels*; shrub; Increaser II (896).

Capparaceae
Cleome maculata *(Sond.) Szyszyl.*; forb; Increaser II (874).

Crassulaceae
Crassula sarcocaulis *Eckl. & Zeyh.* subsp. sarcocaulis; succulent forb; Increaser II (1 035).

Pittosporaceae
Pittosporum viridiflorum *Sims*; tree; Increaser II (1 052).

Myrothamnaceae
Myrothamnus flabellifolia *(Sond.) Welw.*; shrublet; Increaser II.

Rosaceae
Parinari capensis *Harv.* subsp. capensis; shrublet; Increaser II (834).

Fabaceae

Subfamily Mimosoideae
Acacia ataxacantha *DC.*; semi-scandent shrub; Increaser I.
Acacia caffra *(Thunb.) Willd.*; tree; Increaser II (1 011).
Acacia karroo *Hayne*; tree; Increaser II.
Elephantorrhiza burkei *Benth.*; shrub; Increaser II (899, 900).
Elephantorrhiza obliqua *Burtt Davy* var. glabra *Phill.*; shrub; Increaser II (749).

Subfamily Caesalpinioideae
Burkea africana *Hook.*; tree; Increaser II (722).
Cassia comosa *(E. Mey.) Vogel* var. capricornia *Steyaert*; forb; Increaser II (781).

Subfamily Papilionoideae
Calpurnia sp., cf. C. aurea *(Ait.) Benth.*; tree; Increaser II (1 073).
Lotononis sp.; forb; Increaser II (815).
Pearsonia cajanifolia *(Harv.) Polhill* subsp. cryptantha *(Bak.) Polhill*; forb; Increaser II (1 033).
Pearsonia sessilifolia *(Harv.) Duemmer* subsp. sessilifolia; forb; Increaser II (850).
Argyrolobium transvaalense *Schinz*; shrub; Increaser II (861).
Indigofera comosa *N.E. Br.*; shrublet; Increaser II (1 023).
Indigofera egens *N.E. Br.*; forb; Increaser II (868).
Indigofera filipes *Benth. ex Harv.*; forb; Increaser II (960).
Indigofera hedyantha *Eckl. & Zeyh.*; forb; Increaser II (920).
Indigofera hilaris *Eckl. & Zeyh.*; forb; not recorded in sample quadrats; Increaser II (746).
Indigofera spicata *Forssk.*; forb; Increaser II (847).
Psoralea polysticta *Benth.*; shrub; Increaser II (1 047).
Tephrosia elongata *E. Mey.* var. elongata; forb; Increaser II (918).
Tephrosia longipes *Meisn.* var. lurida *(Sond. J.B. Gillett*; forb; Increaser II (879).
Mundulea sericea *(Willd.) A. Chev.*; shrub; Increaser II (734).
Zornia milneana *Mohlenbr.*; forb; Increaser II (854, 1 038).
Abrus laevigatus *E. Mey.*; twining undershrub; Increaser II (992, 1 061).
Glycine wightii *(Wight & Arn.) Verdc.* subsp. wightii var. longicauda *(Schweinf.) Verdc.*; twining forb; Increaser II (988).
Erythrina lysistemon *Hutch.*; tree or shrub; Increaser (989).
Rhynchosia monophylla *Schltr.*; twining forb; Increaser II (853, 925).
Rhynchosia spectabilis *Schinz*; undershrub; Increaser II (980).
Rhynchosia totta *(Thunb.) DC.*; twining forb; Increaser II (966).
Sphenostylis angustifolia *Sond.*; shrublet; Increaser II (1 031).

Oxalidaceae
Oxalis depressa *Eckl. & Zeyh.*; forb; Increaser II (777).

Erythroxylaceae
Erythroxylum emarginatum *Thonn.*; shrub; Increaser I (890).

Rutaceae
Calodendrum capense *(L.f.) Thunb.*; tree; not recorded in sample quadrats; Increaser I (808).
Vepris lanceolata *(Lam.) G. Don.*; tree or shrub; Increaser I (1 063).

Simaroubaceae
Kirkia wilmsii *Engl.*; tree; Increaser I (994).

Malpighiaceae
Sphedamnocarpus pruriens *(Juss.) Szyszyl.* var. pruriens; climber; Increaser II (1 074).

Polygalaceae
Polygala amatymbica *Eckl. & Zeyh.*; forb; Increaser II (745).
Polygala hottentotta *Presl*; forb; Increaser II (928).
Polygala uncinata *E. Mey. ex Meisn.*; forb; not recorded in sample quadrats; Increaser II (802).

Euphorbiaceae
Pseudolachnostylis maprouneifolia *Pax*; tree or shrub; Increaser II (886).
Phyllanthus incurvus *Thunb.*; forb; Increaser II (504).
Phyllanthus parvulus *Sond.*; forb; Increaser II (881).
Croton gratissimus *Burch.* subsp. subgratissimus *(Prain) Burtt Davy*; tree; Increaser II (889).
Acalypha angustata *Sond.* var. glabra *Sond.*; forb; Increaser II (914).
Clutia pulchella *L.*; shrub; Increaser I & II (892, 935, 948).
Euphorbia ingens *E. Mey. ex Boiss.*; tree; Increaser I.
Euphorbia schinzii *Pax*; succulent herb; Increaser II.

Buxaceae
Buxus macowanii *Oliv.*; shrub; Increaser I (987, 1 067).

Anacardiaceae
Lannea discolor *(Sond.) Engl.*; shrub; Increaser II (877).
Lannea edulis *(Sond.) Engl.*; shrublet; Increaser II (875).
Ozoroa paniculosa *(Sond.) R. & A. Fernandes*; tree or shrub; Increaser II (797).
Rhus dentata *Thunb.*; shrub; Increaser I & II (1 037).
Rhus dura *Schonl.*; shrub; Increaser I (873).
Rhus leptodictya *Diels*; tree or shrub; Increaser I & II.
Rhus pyroides *Burch.*; shrub; Increaser II (957, 1 054).

Celastraceae
Maytenus tenuispina *(Sond.) Marais*; shrub; Increaser II (856, 883).
Maytenus undata *(Thunb.) Blakelock*; tree; Increaser I & II (971, 1 059).
Pterocelastrus echinatus *N.E. Br.*; tree or shrub; Increaser II (951).
Pterocelastrus rostratus *(Thunb.) Walp.*; shrub; Increaser I (1 010).

Icacinaceae
Apodytes dimidiata *E. Mey. ex Arn.* subsp. dimidiata; tree or shrub; Increaser I (895, 907, 970).

Sapindaceae
Pappea capensis *Eckl. & Zeyh.*; tree; Increaser II (1 053).

Rhamnaceae
Ziziphus mucronata *Willd.* subsp. mucronata; tree or shrub; Increaser II (963).

Vitaceae
Rhoicissus digitata *(L.f.) Gilg. & Brandt*; climber or shrub; Increaser I & II (869).
Rhoicissus tridentata *(L.f.) Wild & Drum.*; shrub; Increaser II (1 025).

Tiliaceae
Grewia monticola *Sond.*; shrub; Increaser II (1 071).
Grewia occidentalis *L.*; shrub; Increaser I & II (809).
Grewia rogersii *Burtt Davy & Greenway*; shrub; not recorded in sample quadrats; Increaser II (738).
Triumfetta rhomboidea *Jacq.*; shrublet; Increaser II.
Triumfetta sonderi *Fical. & Hiern*; forb; Increaser II (852).

Malvaceae
Pavonia columella *Cav.*; forb; Increaser II (1 020).

Sterculiaceae
Dombeya rotundifolia *(Hochst.) Planch.* var. rotundifolia; tree; Increaser I & II.
Hermannia depressa *N.E. Br.*; forb; Increaser II (1 072).
Waltheria indica *L.*; forb; Increaser II (485).

Ochnaceae
Ochna pulchra *Hook.*; tree or shrub; Increaser I & II.

Clusiaceae
Hypericum aethiopicum *Thunb.* subsp. sonderi *(Bred.) N.K.B. Robson*; forb; Increaser II (841).
Hypericum lalandii *Choisy*; forb; Increaser II (831).

Elatinaceae
Bergia decumbens *Planch. ex Harv.*; forb; Increaser II (816, 826).

Cactaceae
Opuntia sp.; succulent shrub; exotic; Increaser II.

Thymelaeaceae
Gnidia caffra *Meisn.*; forb; not recorded in sample quadrats; Increaser II (798).
Passerina montana *Thoday*; ericoid shrub; Increaser I (756).

Combretaceae
Combretum apiculatum *Sond.*; tree; Increaser II.
Combretum moggii *Exell*; shrub; Increaser I (891, 998).
Combretum molle *R. Br. ex G. Don*; tree; Increaser II.
Combretum zeyheri *Sond.*; tree; Increaser II.
Terminalia sericea *Burch. ex DC.*; tree; Increaser II.

Myrtaceae
Syzygium guineense *(Willd.) DC.*; tree; not recorded in sample quadrats; Increaser I & II (729).
Heteropyxis natalensis *Harv.*; tree; Increaser I & II (848).

Melastomataceae
Dissotis debilis *(Sond.) Triana* var. debilis forma debilis; forb; not recorded in sample quadrats; Increaser I & II (765).

Araliaceae
Cussonia paniculata *Eckl. & Zeyh.*; tree; Increaser II (1 029).
Cussonia spicata *Thunb.*; tree or shrub; Increaser I & II (978).

Apiaceae
Heteromorpha arborescens *(Spreng.) Cham. & Schlechtd.*; shrub; Increaser II (1 068).

Myrsinaceae
Myrsine africana *L.*; shrub; Increaser I & II (946).

Sapotaceae
Bequaertiodendron magalismontanum *(Sond.) Heine & J.H. Hemsl.*; tree or shrub; Increaser I & II.
Mimusops zeyheri *Sond.*; tree or shrub; Increaser II (910).

Ebenaceae
Euclea crispa *(Thunb.) Guerke* var. crispa; tree or shrub; Increaser I & II (518).
Euclea linearis *Zeyh. ex Hiern*; shrub; Increaser II.
Euclea natalensis *A. DC.*; shrub; Increaser II (959, 1 049).
Diospyros lycioides *Desf.* subsp. guerkei *(Kuntze) De Winter*; shrub; Increaser II (958, 1 050).
Diospyros whyteana *(Hiern) F. White*; shrub; Increaser II (944).

Oleaceae
Schrebera alata *(Hochst.) Welw.*; tree; Increaser II (972).
Olea europaea *L.* subsp. africana *(Mill.) P.S. Green*; tree or shrub; Increaser II (999, 1 065).
Jasminum multipartitum *Hochst.*; climbing shrub; Increaser I (754).

Loganiaceae
Strychnos cocculoides *Bak.*; tree; Increaser II.
Strychnos madagascariensis *Poir.*; tree; Increaser II (973).
Strychnos pungens *Soler.*; tree; Increaser II (872).
Nuxia congesta *R. Br. ex Fresen.*; tree; Increaser II (909, 997).
Buddleja salviifolia *(L.) Lam.*; tree; Increaser I (1 017).

Gentianaceae
Chironia purpurascens *(E. Mey.) Benth. & Hook. f.* subsp. humilis *(Gilg) Verdoorn*; forb; Increaser II (829).

Apocynaceae
Acokanthera oppositifolia *(Lam.) Codd*; tree or shrub; Increaser II (1 057).
Landolphia capensis *Oliv.*; shrub; Increaser II (866).
Diplorhynchus condylocarpon *(Mull. Arg.) Pichon*; tree or shrub; Increaser II (544).

Periplocaceae
Cryptolepis oblongifolia *(Meisn.) Schltr.*; shrub; Increaser II.

Asclepiadaceae
Pachycarpus schinzianus *(Schltr.) N.E. Br.*; forb; Increaser II (846).
Asclepias fruticosa *L.*; forb; Increaser II (711).
Asclepias sp.; forb; Increaser II (828).
Secamone alpinii *Schultes*; shrubby climber; Increaser II (953).
Secamone filiformis *(L.f.) J.H. Ross*; shrubby climber; Increaser I (991).

Convolvulaceae
Ipomoea bathycolpos *Hallier f.* var. bathycolpos; forb; Increaser II (858).

Boraginaceae
Ehretia rigida *(Thunb.) Druce*; shrub; Increaser II (1 069).

Verbenaceae
Lantana rugosa *Thunb.*; shrub; Increaser I & II (509).
Lippia javanica *(Burm. f.) Spreng.*; shrublet; Increaser II (840, 1 041).
Vitex pooara *Corbishley*; tree or shrub; Increaser II (885).
Vitex rehmannii *Guerke*; tree or shrub; Increaser II (538).
Clerodendrum glabrum *E. Mey.*; tree; Increaser II (1 070).

Lamiaceae
Leonotis leonurus *(L.) R. Br.*; forb; Increaser II.
Stachys natalensis *Hochst.* var. galpinii *(Briq.) Codd*; forb; not recorded in sample quadrats; Increaser II (740).
Stachys natalensis *Hochst.* var. natalensis; forb; Increaser II (862, 969).
Plectranthus fruticosus *L'Hérit.*; forb; Increaser II (947).
Plectranthus verticillatus *(L.f.) Druce*; forb; Increaser II (990).
Plectranthus sp.; undershrub; Increaser II (906).
Becium obovatum *(E. Mey. ex Benth.) N.E. Br.*; forb; Increaser II (902).

Solanaceae
Solanum giganteum *Jacq.*; forb; Increaser II (1 009).
Solanum panduraeforme *E. Mey.*; forb; Increaser II (1 051).
Solanum rigescens *Jacq.*; forb; not recorded in sample quadrats; Increaser II (771).

Scrophulariaceae
Nemesia fruticans *(Thunb.) Kuntze*; forb; Increaser II (929).
Sutera palustris *Hiern*; forb; Increaser II (1 022).

Selaginaceae
Selago capitellata *Schltr.*; forb; Increaser II (919).
Striga bilabiata *(Thunb.) Kuntze*; parasitic forb (968).
Striga gesnerioides *(Willd.) Vatke ex Engl.*; parasitic forb (984).

Acanthaceae
Chaetacanthus costatus *Nees*; shrublet; Increaser II (933).
Ruellia cordata *Thunb.*; forb; Increaser II (860).
Barleria bremekampii *Oberm.*; shrublet; Increaser II (1 005).
Blepharis subvolubilis *C.B. Cl.* var. subvolubilis; forb; Increaser II (976).
Crossandra greenstockii *S. Moore*; shrublet; not recorded in sample quadrats; Increaser II (731).
Hypoestes verticillaris *(L.f.) R. Br. ex C.B. Cl.*; forb; Increaser II (995).

Rubiaceae
Oldenlandia herbacea *(L.) Roxb.*; forb; Increaser II (763).
Tarenna supra-axilaris *(Hemsl.) Brem.* subsp. barbertonensis *(Brem.) Bridson* (*T. barbertonensis* (Brem.) Brem.); shrub; Increaser II (1 000).
Gardenia volkensii *K. Schum.* subsp. volkensii (*G. spatulifolia* Stapf & Hutch.); shrub; Increaser I & II (884, 1 046).
Rothmannia capensis *Thunb.*; tree; Increaser I (1 051).
Tricalysia lanceolata *(Sond.) Burtt Davy*; tree; Increaser I (1 060).
Pentanisia angustifolia *(Hochst.) Hochst.*; forb; Increaser II (943).
Vangueria infausta *Burch.* subsp. infausta; shrub; Increaser II (772).
Pygmaeothamnus zeyheri *(Sond.) Robyns* var. zeyheri; perennial shrublet with woody rootstock; Increaser II (832, 897).
Tapiphyllum parvifolium *(Sond.) Robyns*; shrub; Increaser II (871).
Canthium gilfillanii *(N.E. Br.) O.B. Miller*; shrub not recorded in sample quadrats; Increaser I (717).

Canthium huillense *Hiern*; shrub; Increaser II (996).
Pachystigma triflorum *Robyns*; shrub; Increaser I & II (870).
Fadogia monticola *Robyns*; shrublet; Increaser II (799).
Anthospermum rigidum *Eckl. & Zeyh.*; forb; Increaser II (855).
Richardia brasiliensis *Gomez*; procumbent forb; Increaser II (843).
Richardia scabra *L.* (*Borreria scabra* (Schumach. & Thonn.) K. Schum.); forb; Increaser II (1 043).

Dipsacaceae
Scabiosa columbaria *L.*; forb; Increaser II (825).

Campanulaceae
Wahlenbergia caledonica *Sond.*; forb; Increaser II (922).
Wahlenbergia lycopodioides *Schltr. & V. Brehm.*; forb; Increaser II (938).
Lightfootia paniculata *Sond.*; forb; not recorded in sample quadrats; Increaser II (750).

Lobeliaceae
Lobelia aquaemontis *E. Wimm.*; forb; Increaser II (940).
Lobelia decipiens *Sond.*; forb; Increaser II (814).

Asteraceae
Vernonia galpinii *Klatt*; shrublet; Increaser II (977, 1 012).
Vernonia natalensis *Sch. Bip.*; shrublet; Increaser II (865, 1 027).
Vernonia oligocephala *(DC.) Sch. Bip. ex Walp.*; shrublet; Increaser II (844).
Vernonia staehelinoides *Harv.*; forb; Increaser II (965, 1 032).
Felicia muricata *(Thunb.) Nees* subsp. strictifolia *Grau*; forb; Increaser II (803).
Conyza scabrida *DC.*; forb; Increaser II (1 055).
Brachylaena rotundata *S. Moore*; shrub; Increaser II (903).
Gnaphalium filagopsis *Hilliard & Burtt* (*Amphidoxa filaginea* Fical. & Hiern); forb; Increaser II (824).
Helichrysum caespititium *(DC.) Harv.*; forb; Increaser II (751).
Helichrysum cephaloideum *DC.*; forb; Increaser II (937).
Helichrysum kraussii *Sch. Bip.*; shrublet; Increaser II.
Helichrysum mimetes *S. Moore*; forb; Increaser II (923).
Helichrysum nudifolium *(L.) Less.* var. nudifolium; forb; Increaser II (839).
Helichrysum uninervium *Burtt Davy*; forb; Increaser II (778).
Helichrysum sp.; forb; Increaser II (921).
Stoebe vulgaris *Levyns*; ericoid shrublet; Increaser III (724).
Geigeria burkei *Harv.* subsp. burkei var. burkei; shrublet; Increaser II (833).
Geigeria burkei *Harv.* subsp. burkei var. zeyheri *(Harv.) Merxm.*; shrublet; Increaser II (934).
Geigeria elongata *Alston*; forb; Increaser II (898).
Bidens pilosa *L.*; exotic forb; Increaser II.
Schkuhria pinnata *(Lam.) Cabr.*; forb; exotic; Increaser II (964).
Tagetes minuta *L.*; forb; exotic; Increaser II.
Brachymeris bolusii *Hutch.*; shrublet; Increaser II (1 014).
Lopholaena coriifolia *(Sond.) Phill. & C.A. Sm.*; shrub; Increaser II (1 036).
Cineraria lobata *L'Hérit.*; forb; Increaser II (932).
Senecio barbertonicus *Klatt*; shrub; Increaser II (1 003).
Senecio conrathii *N.E. Br.*; forb; Increaser II (823).
Senecio erubescens *Ait.* var. crepidifolius *DC.*; forb; Increaser II (813).
Senecio oxyriifolius *DC.*; forb; Increaser II (1 024).
Senecio pleistocephalus *S. Moore*; shrub; Increaser II (1 056).
Senecio ruwenzoriensis *S. Moore*; forb; Increaser II (1 034).
Senecio venosus *Harv.*; forb; Increaser II (864).
Euryops pedunculatus *N.E. Br.*; shrub; Increaser II (916).
Osteospermum jucundum *(Phill.) T. Norl.*; forb; Increaser II (942).
Ursinia nana *DC.*; forb; Increaser II (936).
Gazania krebsiana *Less.* subsp. serrulata *(DC.) Roessl.*; forb; Increaser II (804).
Berkheya carlinopsis *Welw. ex O. Hoffm.* subsp. magalismontana *(H. Bol.) Roessl.*; forb; Increaser II (908).
Dicoma anomala *Sond.* subsp. anomala; forb; Increaser II (915).
Gerbera ambigua *(Cass.) Sch. Bip.*; forb; Increaser II (1 030).

ACKNOWLEDGEMENTS

The authors thank Dr J. C. Scheepers for comments and the staff of the National Herbarium for identification of the taxa.

UITTREKSEL

'n Kontrolelys van 332 plantspesies, wat 226 genusse en 84 families verteenwoordig, word gegee vir die plaas Groothoek, distrik Thabazimbi, Transvaal. Groeivorm, benuttingsklas en kontrole-eksemplaar word aangetoon.

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A checklist of Pteridophyta of the north-eastern Orange Free State

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Keywords: checklist, north-east Orange Free State, Pteridophyta

ABSTRACT

A checklist of Pteridophyta recorded within a defined area of the north-eastern Orange Free State is presented. The geology, climate and vegetation of this area are discussed in brief.

INTRODUCTION

The 63 species of pteridophytes mentioned in this checklist occur in an area within the north-eastern Orange Free State. The area comprises the following quarter degree square grids:

2828 (Bethlehem): –AD, –BC, –CB, –DA, –DB;
2829 (Harrismith): –AA, –AB, –AC, –AD, –BA, –BB, –BC, –CA.

A single voucher specimen is cited for each quarter degree square in which the respective species has been recorded to date. All the cited vouchers are currently housed in the Drakensberg National Botanic Garden Herbarium, unless otherwise stated.

TOPOGRAPHY AND GEOLOGY

The study area borders on Natal and Lesotho. To the south of it lies Lesotho which forms the watershed between the Orange and Vaal River systems and the eastern escarpment which forms the watershed between the Vaal and Tugela River systems of Natal.

Included in the area are the steep mountainous parts with the highest point at c. 3 281 m near Montaux-Sources. Although the elevation of most of the area is much lower (c. 1 500–1 700 m) the topography is much dissected along the foothills of the high Drakensberg and the Natal border. Further inland the topography is less dissected but a few prominent outliers such as Platberg (2 394 m), Bakerskop (2 037 m) and Rensburgkop (2 235 m) arise almost directly from the surrounding almost flat landscape. King (1982) suggested that these steep-sided residuals of the Clarens Formation and black Drakensberg basalt, occurring largely along the present-day escarpment, already formed a watershed in Early Cenozoic time.

As in the High Drakensberg, most of the higher outliers are overlain by basaltic lava to a thickness of c. 914 m which forms a steep upper catchment of well grassed hills and valleys. The geology of the area and surroundings has been mapped and described by Van Eeden (1937), Visser (1955), Killick (1963), Van der Eyck (1967), Spies (1969) and King (l.c.).

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CLIMATE

The climate within the region can be described as temperate during the summer months but severe during the winter. Temperatures fluctuate considerably and are influenced by factors such as topography, altitude and wind. During the summer (October–March) day temperatures may reach 30°C while the night temperatures may often reach a maximum of 13°C. Winter temperatures are more severe and the day temperatures frequently do not reach the 15°C mark. On many occasions the maximum temperature barely reaches 5°C. Night temperatures may drop as low as –15°C. It can be accepted that at higher elevations the temperature may be considerably lower and that frost is an almost daily occurrence during the months April to August.

The predominant winds blow either from the west or the east. The westerly winds may often reach gale force during the period August to September and regularly cause dust storms. These winds are dry and warm, whereas the easterly winds usually cause a considerable, usually rapid, drop in temperature along the escarpment and higher-lying areas.

Rain usually falls either in the form of gentle soaking rain or severe thunderstorms, often associated with hail. The main rainy season is from September to March. The average precipitation at Harrismith is about 777 mm per annum while at Phuthaditjhaba (Witsieshoek) it is 811 mm per annum (Weather Bureau, 1965). At higher elevations the precipitation can exceed 1 000 mm (Killick 1978). Here snowfalls are experienced annually between the period July to September; lower-lying areas experience only sporadic snowfalls.

VEGETATION

Acocks (1975), recognized three major vegetation types within the study area. Highveld Sourveld (no. 44) occupies the lower-lying areas whereas the Highveld Sourveld to *Cymbopogon–Themeda* Veld Transition (no. 56) occurs along the Natal escarpment. *Themeda–Festuca* Alpine Veld (no. 58) is largely confined to the High Drakensberg along the Lesotho border.

Published works on the vegetation of the north-eastern Free State and surroundings are limited to species lists of the Golden Gate Highlands National Park by Roberts (1969), Markötter's (1930) compilation of Thode's plant collections between 1891 and

1914 at Phuthaditjhaba (Witsieshoek), Oliviershoek Pass and Koolhoek, and a plantsociological study on the pioneer vegetation in the north-eastern Free State carried out by Stam (1973).

Vegetation surveys of the higher lying regions of the Natal Drakensberg bordering on the study area were carried out by Staples & Hudson (1938), Killick (1963) and Edwards (1967).

Most of the area is covered by grassland. The deep valleys and protected gorges at lower elevations, especially on the moist eastern slopes, are forested and are mostly dominated by *Leucosidea sericea* and mixed *Leucosidea–Buddleja* scrub forest. The more sheltered forests are dominated by *Podocarpus latifolius* (Thunb.) R. Br. ex Mirb.

The abundance of bulbous plants together with the fire-resistance of most plants occurring in the grassveld areas suggest that fire has been an important factor since very early times (Bayer 1955).

UITTREKSEL

'n Kontrolelys van Pteridophyta, wat binne 'n omskrewe gebied in die noordoostelike Oranje-Vrystaat waargeneem is, word gegee. Die geologie, klimaat en plantegroei van die gebied word kortliks bespreek.

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CHECKLIST

LYCOPODIACEAE

Lycopodium *L.*
- clavatum *L.* 2829 (Harrismith): (–AD), *Roux 846*; (–CA), *Roux 1078.*
- saururus *Lam.* 2829 (Harrismith): (–AC), *Roux 987*; (–AD), *Roux 852*; (–CA), *Roux 1283.*
- verticillatum *L.f.* 2829 (Harrismith): (–CA), *Roux 836.*

SELAGINELLACEAE

Selaginella *Beauv.*
- caffrorum *(Milde) Hieron.* 2828 (Bethlehem): (–DA), *Roux 1014.* 2829 (Harrismith): (–AC), *Roux 1549*; (–CA), *Roux 879*; (–CB), *Roux 928.*
- imbricata *(Forssk.) Spring ex Decne.* 2828 (Bethlehem): (–DA), *Roux 1030*; (–DB), *Roux 906.*
- mittenii *Bak.* 2829 (Harrismith): (–AC), *Roux 868*; (–AD), *Roux 884.*

ISOETACEAE

Isoetes *L.*
- transvaalensis *Jermy & Schelpe* 2828 (Bethlehem): (–DB), *Roux 955.* 2829 (Harrismith): (–AC), *Roux 1277.*

EQUISETACEAE

Equisetum *L.*
- ramosissimum *Desf.* 2828 (Bethlehem): (–DA), *Roux 1023.* 2829 (Harrismith): (–AC), *Roux 1551.*

OPHIOGLOSSACEAE

Ophioglossum *L.*
- lancifolium *Presl* 2828 (Bethlehem): (–DB), *Roux 954.*
- polyphyllum *A. Br.* 2828 (Bethlehem): (–BC), *Roux 939*; (–BD), *Roux 950.* 2829 (Harrismith): (–AA), *Roux 1035*; (–AC), *Van der Zeyde s.n.*; (–AD), *Roux 1060.*

OSMUNDACEAE

Osmunda *L.*
- regalis *L.* 2829 (Harrismith): (–CA), *Roux 1285.*

SCHIZAEACEAE

Mohria *Swartz*
- caffrorum *(L.) Desv.* 2828 (Bethlehem): (–BC), *Roux 947*; (–DB), *Roux 912.* 2829 (Harrismith): (–AA), *Roux 1501*; (–AC), *Roux 807*; (–AD), *Roux 861.*
- hirsuta *J.P. Roux* 2828 (Bethlehem): (–DB), *Roux 1214.* 2829 (Harrismith): (–CA), *Roux 1068.*

GLEICHENIACEAE

Gleichenia *J.E. Sm.*
- polypodioides *(L.) J.E. Sm.* 2829 (Harrismith): (–AA), *Roux 1505*; (–CA), *Roux 1073.*

CYATHEACEAE

Cyathea *J.E. Sm.*
- dregei *Kunze* 2829 (Harrismith): (–AD), *Roux 862*; (–CA), *Roux 1287.*

HYMENOPHYLLACEAE

Trichomanes *L.*
- pyxidiferum var. melanotrichum *(Schlechtd.) Schelpe* 2829 (Harrismith): (–AD), *Roux 886.*

Hymenophyllum *J.E. Sm.*
- tunbridgense *(L.) J.E. Sm.* 2829 (Harrismith): (–AC), *Roux 986*; (–AD), *Roux 851.*

MARSILEACEAE

Marsilea *L.*
- burchellii *(Kunze) A. Br.* 2829 (Harrismith): (–AC), *Roux 989.*
- macrocarpa *Presl* 2829 (Harrismith): (–AC), *Jacobz 4719.*

DENNSTAEDTIACEAE

Pteridium *Gled. ex Scop.*
- aquilinum *(L.) Kuhn* subsp. aquilinum 2829 (Harrismith): (–AC), *Roux 1530*; (–CA), *Roux 1284.*

ADIANTACEAE/PTERIDACEAE

Pityrogramma *Link*
- calomelanos *(Swartz) Link* var. aureoflava *(Hook.) Weath. ex Bailey* 2829 (Harrismith): (–AC), *Roux 1280.*

Anogramma *Link*
leptophylla *(L.) Link* 2829 (Harrismith): (–AC), *Roux 1074.*

Adiantum *L.*
capillus-veneris *L.* 2828 (Bethlehem): (–BC), *Roux 935*; (–DA), *Roux 1029.* 2829 (Harrismith): (–AC), *Roux 1547*; (–CA), *Roux 837.*
poiretii *Wikstr.* 2829 (Harrismith): (–AC), *Roux 1543*; (–CA), *Roux 1526.*

Pteris *L.*
cretica *L.* 2828 (Bethlehem): (–DA), *Roux 1027.* 2829 (Harrismith): (–CA), *Roux 1527.*

Cheilanthes *Swartz*
capensis *(Thunb.) Swartz* 2829 (Harrismith): (–AC), *Roux 927.*
eckloniana *(Kunze) Mett.* 2828 (Bethlehem): (–BC), *Roux 940*; (–BD), *Roux 951*; (–DA), *Roux 1015*; (–DB), *Roux 920.* 2829 (Harrismith): (–AC), *Van der Zeyde s.n.*
hirta *Swartz* 2828 (Bethlehem): (–BC), *Roux 933*; (–DA), *Roux 1016.* 2829 (Harrismith): (–AC), *Roux 795*; (–CA), *Roux 1525.*
multifida *(Swartz) Swartz* 2829 (Harrismith): (–AC), *Roux 822.*
quadripinnata *(Forssk.) Kuhn* 2828 (Bethlehem): (–BC), *Roux 932*; (–DA), *Roux 1018.* 2829 (Harrismith): (–AC), *Roux 812.*
viridis *(Forssk.) Swartz* var. viridis 2829 (Harrismith): (–AC), *Van der Zeyde s.n.*
viridis var. glauca *(Sim) Schelpe & N.C. Anthony* 2828 (Bethlehem): (–DA), *Roux 1020*; (–DB), *Roux 1236.* 2829 (Harrismith): (–AC), *Roux 863.*

Pellaea *Link*
calomelanos *(Swartz) Link* 2828 (Bethlehem): (–DA), *Roux 1017.* 2829 (Harrismith): (–AC), *Roux 869*; (–CA), *Van der Zeyde s.n.*

POLYPODIACEAE

Polypodium *L.*
polypodioides *(L.) Hitchc.* subsp. ecklonii *(Kunze) Schelpe* 2829 (Harrismith): (–CA), *Roux 878.*
vulgare *L.* 2829 (Harrismith): (–AC), *Roux 820*; (–AD), *Roux 890.*

Pleopeltis *H.B.K. ex Willd.*
macrocarpa *(Bory ex Willd.) Kaulf.* 2828 (Bethlehem): (–BC), *Roux 946*; (–DA), *Roux 1025.* 2829 (Harrismith): (–AC), *Jacobz 4716.*
schraderi *(Mett.) Tardieu* 2828 (Bethlehem): (–DA), *Roux 1024.* 2829 (Harrismith): (–AA), *Roux 1506*; (–AC), *Roux 821*; (–DA), *Roux 853.*

ASPLENIACEAE

Asplenium *L.*
adiantum-nigrum *L.* 2828 (Bethlehem): (–BC), *Roux 929*; (–DA), *Roux 1028.* 2829 (Harrismith): (–AC), *Roux 797.*
aethiopicum *(Burm. f.) Becherer* 2828 (Bethlehem): (–BD), *Roux 952*; (–DB), *Roux 918*; 2829 (Harrismith): (–AC), *Roux 1545*; (–AD), *Roux 854*; (–CA), *Roux 829.*
monanthes *L.* 2829 (Harrismith): (–AC), *Roux 796*; (–CA), *Roux 877.*
platyneuron *(L.) Oakes* 2828 (Bethlehem): (–BC), *Roux 930.* 2829 (Harrismith): (–AC), *Roux 785*; (–AD), *Roux 860.*
splendens *Kunze* subsp. drakensbergense *Braithwaite* 2828 (Bethlehem): (–DB), *Roux 1532.* 2829 (Harrismith): (–AC), *Roux 921.*
stoloniferum *Bory* 2828 (Bethlehem): (–DA), *Roux 1219.* 2829 (Harrismith): (–AC), *Roux 818*; (–CA), *Roux 833.*
theciferum *(H.B.K.) Mett.* var. concinnum *(Schrad.) Schelpe* 2829 (Harrismith): (–AD), *Roux 889*; (–CA), *Roux 830.*
trichomanes *L.* 2828 (Bethlehem): (–BC), *Roux 934*; (–DA), *Roux 1026*; (–DB), *Roux 1683.* 2829 (Harrismith): (–AC), *Roux 785.*
varians *Wall. ex Hook. & Grev.* subsp. fimbriatum *(Kunze) Schelpe* 2828 (Bethlehem): (–DA), *Roux 1218.* 2829 (Harrismith): (–AD), *Roux 888*; (–CA), *Roux 1215.*

Ceterach *DC.*
cordatum *(Thunb.) Desv.* 2828 (Bethlehem): (–BC), *Roux 941.* 2829 (Harrismith): (–AC), *Roux 1554.*

ATHYRIACEAE

Cystopteris *Bernh.*
fragilis *(L.) Bernh.* 2828 (Bethlehem): (–DA), *Roux 1019*; (–DB), *Roux 922.* 2829 (Harrismith): (–AC), *Roux 1544*; (–AD), *Roux 855.*

Athyrium *Roth*
scandicinum *(Willd.) Presl* 2829 (Harrismith): (–AC), *Roux 1531.*

LOMARIOPSIDACEAE

Elaphoglossum *Schott*
acrostichoides *(Hook & Grev.) Schelpe* 2828 (Bethlehem): (–BC), *Roux 936.* 2829 (Harrismith): (–AC), *Roux 799*; (–AD), *Roux 847*; (–CA), *Roux 838.*
drakensbergense *Schelpe* 2828 (Bethlehem): (–DB), *Roux 971.* 2829 (Harrismith): (–AC), *Roux 824.*
spathulatum *(Bory) T. Moore* 2829 (Harrismith): (–AD), *Roux 1062*; (–CA), *Roux 882.*

ASPIDIACEAE/DRYOPTERIDACEAE

Woodsia *R. Br.*
montevidensis *(Spreng.) Hieron.* var. burgessiana *(Gerr. ex Hook. & Bak.) Schelpe* 2828 (Bethlehem): (–DB), *Roux 956.* 2829 (Harrismith): (–AA), *Roux 1503*; (–AD), *Roux 856.*

Dryopteris *Adans.*
dracomontana *Schelpe & N.C. Anthony* 2828 (Bethlehem): (–DB), *Roux 904.* 2829 (Harrismith): (–AC), *Roux 1040.*
pentheri *(Krasser) C. Chr.* 2828 (Bethlehem): (–DA), *Roux 1217.* 2829 (Harrismith): (–AC), *Roux 1546*; (–AD), *Roux 1063*; (–CA), *Roux 875.*

Polystichum *Roth*
alticola *Schelpe & N.C. Anthony* 2829 (Harrismith): (–AC), *Roux 782*; (–AD), *Roux 892*; (–CA), *Roux 876.*
dracomontanum *Schelpe & N.C. Anthony* 2829 (Harrismith): (–AA), *Roux 1502*; (–AD), *Roux 896.*
pungens *(Kaulf.) Presl* 2829 (Harrismith): (–AC), *Roux 987.*
luctuosum *(Kunze) T. Moore* 2828 (Bethlehem): (–DB), *Roux 1228.* 2829 (Harrismith): (–AC), *Roux 987.*
transvaalense *N.C. Anthony* 2828 (Bethlehem): (–BC), *Roux 937.*

BLECHNACEAE

Blechnum *L.*
giganteum *(Kaulf.) Schlechtd.* 2829 (Harrismith): (–CA), *Roux 883.*
inflexum *(Kunze) Kuhn* 2829 (Harrismith): (–AC), *Roux 793*; (–AD), *Roux 859*; (–CA), *Roux 831.*
punctulatum *Swartz* 2828 (Bethlehem): (–BC), *Roux 948.* 2829 (Harrismith): (–AA), *Roux 1504*; (–AC), *Roux 1548*; (–CA), *Roux 827.*

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Miscellaneous notes

VARIOUS AUTHORS

CHROMOSOME STUDIES ON AFRICAN PLANTS. 1.

The use of cytogenetics in plant taxonomy is important for the determination of phylogenetic relationships. The aim of this series is to publish miscellaneous information regarding chromosome studies on African plants. Chromosome numbers determined by meiotic studies are given as the haploid number (n), in contrast to numbers determined by mitotic studies which are given as the somatic chromosome number (2n). The herbarium voucher specimen number and locality of the collected material (according to the Degree Reference System — Edwards & Leistner 1971; Leistner & Morris 1976), is included.

POACEAE

The grass genera mentioned in this paper, appear in the same order as that described by Gibbs Russell *et al.* (1984). The subdivision of the plants into tribes is according to Dyer (1976). All voucher specimens are housed in the National Herbarium (PRE).

Andropogoneae

Arthraxon lanceolatus (Roxb.) Hochst. var. *lanceolatus*: **n = 18.**

TRANSVAAL. — 2430 (Pilgrim's Rest): Blyderivierspoort Nature Reserve (–DB), *Spies 1423.*

Andropogon eucomus Nees: **n = 20.**

TRANSVAAL. — 2530 (Lydenburg): 13 km from Boshoek to Buffelsvlei (–AC), *Spies 1525.*

Andropogon lacunosus J. G. Anders.: **n = 9.**

TRANSVAAL. — 2530 (Lydenburg): 18 km from Dullstroom to Goede Hoop (–AC), *Spies 1468, 1475.*

Trachypogon spicatus (L. f.) Kuntze: **n = 10.**

TRANSVAAL. — 2530 (Lydenburg): 18 km from Dullstroom to Goede Hoop (–AC), *Spies 1437.*

Heteropogon contortus (L.) Roem. & Schult.: **n = 20, n = 23.**

TRANSVAAL. — 2529 (Witbank): 67 km from Lydenburg to Roossenekal (–BB), *Spies 1626* (n = 20). 2530 (Lydenburg): Goede Hoop (–AC), *Spies 1578* (n = 23).

Paniceae

Alloteropsis semialata (R. Br.) Hitchc. subsp. *eckloniana* (Nees) Gibbs Russell: **n = 9.**

TRANSVAAL. — 2430 (Pilgrim's Rest): Blyderivierspoort Nature Reserve (–DB), *Spies 1420.*

Brachiaria nigropedata (Fical. & Hiern) Stapf: **n = 9.**

TRANSVAAL. — 2430 (Pilgrim's Rest): 23 km from Boshoek to Diepgeset (–CD), *Spies 1546.*

Setaria nigrirostris (Nees) Dur. & Schinz: **n = 18.**

TRANSVAAL. — 2430 (Pilgrim's Rest): Blyderivierspoort Nature Reserve (–DB), *Spies 1422.*

Setaria pallide-fusca (Schumach.) Stapf & C.E. Hubb.: **n = 18.**

TRANSVAAL. — 2530 (Lydenburg): 31 km from Lydenburg to Roossenekal (–AB), *Spies 1609.*

Rhynchelytrum nerviglume (Franch.) Chiov.: **n = 18.**

TRANSVAAL. — 2530 (Lydenburg): 15 km from Dullstroom to Goede Hoop (–AC), *Spies 1454.*

Tricholaena monachne (Trin.) Stapf & C.E. Hubb. var. *monachne*: **n = 18.**

TRANSVAAL. — 2530 (Lydenburg): 15 km from Boshoek to Diepgeset (–AC), *Spies 1541.*

Anthephora pubescens Nees: **n = 18.**

CAPE PROVINCE. — 2624 (Vryburg): Armoedsvlakte Experimental Farm (–DC), *Spies 742, 743, 744 & 745.*

Arundinelleae

Arundinella nepalensis Trin.: **n = 20.**

TRANSVAAL. — 2530 (Lydenburg): Goede Hoop (–AC), *Spies 1583.*

Aristideae

Aristida canescens Henr. subsp. *canescens*: **n = 22, n = 55/2.**

TRANSVAAL. — 2530 (Lydenburg): 6 km from Goede Hoop to Roossenekal (–AA), *Spies 1497* (n = 22); 24 km from Dullstroom to Goede Hoop (–AC), *Spies 1484* (n = 22); Frischgewaagd (–AC), *Spies 1569* (n = 55/2).

Chlorideae

Microchloa caffra Nees: **n = ~50.**

TRANSVAAL. — 2530 (Lydenburg): 36 km from Lydenburg to Roossenekal (–AA), *Spies 1603.*

Harpochloa falx (L. f.) Kuntze: **n = 20.**

TRANSVAAL. — 2530 (Lydenburg): 18 km from Dullstroom to Goede Hoop (–AC), *Spies 1440.*

Ctenium concinnum Nees: **n = ~50.**

TRANSVAAL. — 2530 (Lydenburg): 6 km from Goede Hoop to Lydenburg (–AA), *Spies 1495.*

Eragrostideae

Eragrostis barbinodis Hack.: **n = 10.**

TRANSVAAL. — 2430 (Pilgrim's Rest): 23 km from Boshoek to Diepgeset (–CD), *Spies 1549.*

Eragrostis capensis (Thunb.) Trin.: **n = 20.**

TRANSVAAL. — 2530 (Lydenburg): 15 km from Dullstroom to Goede Hoop (–AC), *Spies 1451.*

Eragrostis curvula (Schrad.) Nees: **n = 20.**

TRANSVAAL. — 2530 (Lydenburg): 18 km from Dullstroom to Goede Hoop (–AC), *Spies 1442.*

CAPE PROVINCE. — 3227 (Stutterheim): 5 km from Kei Road to Macleantown (–DA), *Spies 1684.*

Eragrostis gummiflua Nees: **n = 30.**

TRANSVAAL. — 2530 (Lydenburg): 31 km from Lydenburg to Roossenekal (–AB), *Spies 1613.*

Eragrostis micrantha Hack.: **n = 20.**

TRANSVAAL. — 2529 (Witbank): 67 km from Lydenburg to Roossenekal (–BB), *Spies 1627.*

Eragrostis pseudosclerantha Chiov.: **n = 20.**

TRANSVAAL. — 2530 (Lydenburg): 13 km from Lydenburg to Roossenekal (–AB), *Spies 1512*; 13 km from Boshoek to Buffelshoek (–AC), *Spies 1532.*

Eragrostis sclerantha Nees subsp. *sclerantha*: **n = 20.**

TRANSVAAL. — 2530 (Lydenburg): 36 km from Lydenburg to Roossenekal (–AA), *Spies 1593.*

Eragrostis superba Peyr.: **n = 20.**

TRANSVAAL. — 2530 (Lydenburg): 10 km from Boshoek to Buffelsvlei (–AC), *Spies 1520.*

Eleusine indica (L.) Gaertn. subsp. *africana* (K.-O'Byrne) S. M. Phillips: **n = 18.**

TRANSVAAL. — 2430 (Pilgrim's Rest): 38 km from Lydenburg to Pilgrim's Rest (–DC), *Spies 1560.*

Stiburus alopecuroides (Hack.) Stapf: **n = 10.**

TRANSVAAL. — 2530 (Lydenburg): Goede Hoop (–AC), *Spies 1580.*

Poeae

Festuca caprina Nees var. *caprina*: **n = 28.**

TRANSVAAL. — 2530 (Lydenburg): 18 km from Dullstroom to Goede Hoop (–AC), *Spies 1441.*

Festuca scabra Vahl: **n = 35, n = 63/2.**

TRANSVAAL. — 2530 (Lydenburg): 15 km from Dullstroom to Goede Hoop (–AC), *Spies 1460* (n = 35); Long Tom Pass (–CA), *Spies 1436* (n = 63/2).

Lolium multiflorum Lam.: **n = 7.**

TRANSVAAL. — 2530 (Lydenburg): 31 km from Lydenburg to Roossenekal (–AB), *Spies 1617.*

Bromus unioloides H.B.K.: **n = 14, n = 28.**

TRANSVAAL. — 2430 (Pilgrim's Rest): Blyderivierspoort Nature Reserve (–DB), *Spies 1425* (n = 14). 2530 (Lydenburg): 31 km from Lydenburg to Roossenekal (–AB), *Spies 1616* (n = 28).

Agrostideae

Agrostis barbuligera Stapf var. *barbuligera*: **n = 21.**

TRANSVAAL. — 2530 (Lydenburg): 18 km from Dullstroom to Goede Hoop (–AC), *Spies 1469.*

Agrostis eriantha Hack. var. *eriantha*: **n = 21.**

TRANSVAAL. — 2530 (Lydenburg): Frischgewaagd (–AC), *Spies 1574.*

Aveneae

Holcus lanatus L.: **n = 14.**

TRANSVAAL. — 2530 (Lydenburg): 5 km from Belfast to Dullstroom (–CA), *Spies 1561.*

DISCUSSION

Normal meiosis was observed in all specimens except *Spies 1578,* an aneuploid specimen of *Heteropogon contortus* (2n = 46), in which a number of univalents, anaphase I bridges and chromosome laggards during anaphase I were observed.

As a result of this study, and with reference to published chromosome numbers (Darlington & Wylie 1955; Ornduff 1967–1969; Fedorov 1969; Moore, R. J. 1970–1977; Moore, D. M. 1982; Goldblatt 1981 & 1984), it was inferred that in most of the investigated species the following basic chromosome numbers occur: x = 7 in the Poeae, Agrostideae and Aveneae, x = 9 in the Paniceae, x = 10 in the Andropogoneae, Arundinelleae, Chlorideae and Eragrostideae, and x = 11 in the Aristideae. Exceptions were *Arthraxon lanceolatus* (2n = 36) and *Andropogon lacunosus* (2n = 18) in the Andropogoneae and *Eleusine indica* (2n = 36) in the Eragrostideae.

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J. J. SPIES and H. DU PLESSIS

A BRIEF NOTE ON TCD AND DBN AND THE HERBARIA OF SONDER, HOOKER AND HARVEY

Recently I had the opportunity to spend two days at the herbarium of the School of Botany, Trinity College, Dublin (TCD) and one day at the National Botanic Gardens of Glasnevin in Dublin (DBN). As the collections were so much richer than I had expected, I write this note, based on my very inadequate information, to alert other botanists to the importance of the collections housed at TCD and DBN.

Although there had been a small collection of plants at TCD, the herbarium was really developed by W. H. Harvey, from 1845 onwards. Harvey held the post of curator from 1845, and in 1848 was appointed as Professor of Botany of the Royal Dublin Society, and in 1856 Professor of Botany at Trinity College. He had worked in the Cape for about four years between 1835 and 1842, and started the Flora Capensis in collaboration with Sonder. They pro-

duced the first three volumes between 1860 and 1865. To this end Harvey received numerous collections from amateur and professional collectors in the Cape Province and Natal, mainly between 1850 and 1870. He published many new species, the holotypes of which are at TCD. In addition, the relevant sections of the herbarium were loaned to Kew during the preparation of the second part of the Flora Capensis under Thiselton-Dyer (between 1896 and 1913) and so contain iso-, syn-, and some holotypes of the very numerous new species published during the preparation of that great work.

After Harvey's death in 1866 the College did not spend any more money on the herbarium, although further gifts of material were received from all over the world. Much of this material was not mounted or incorporated, and was kept in boxes. Some of this material was donated to the National Botanic Gardens of Glasnevin. Unfortunately they are as short-staffed as the University, and consequently much of this material is still in the original parcels. It does contain at least some material from Harvey's herbarium, and might contain historically important collections.

As a sample of what TCD contains, I surveyed two subtribes of the Orchidaceae. The following collectors were represented in the Disinae: Harvey (about half of the collections, mostly around the Cape Peninsula), Ecklon & Zeyher (material from the Uitenhage area), Drège, Hutton, Fannin (some watercolours, with vouchers collected by G. F. F. (George F. Fannin), Gerrard & McKen, MacOwan, Bowker, Barber (they often collected together, signed as F. W. B. and J. H. B.), Hallack, Saunders, Sanderson, Holland, Cooper, Plant, Krauss, Verreaux (acquired from the Delessert herbarium in 1844), W. S. M. D'urban and Brownlee. This collection includes the types of 17 names, of which several are holotypes.

In the Coryciinae (Orchidaceae) there are even more types. In several other groups there are interesting collections: a large set of Ericaceae from the Cedarberg collected by Wallich and a set of Cyperaceae from around Graaff-Reinet by H. Bolus. I am sure that more detailed research will expose much more material of great interest.

DBN houses, amongst others, a collection by McNab, that includes a set of all plants that flowered at Kew in the first decade of the nineteenth century. This is being catalogued by Dr Nelson, the botanist at Glasnevin. This collection may provide types for names published in the Hortus Kewensis.

Until 1870 there were three large herbaria of South African plants: those of Sonder, Harvey and Hooker. Sonder's herbarium included a fairly complete set of Ecklon & Zeyher collections, as well as other collectors. The Cape plants in this herbarium were sold to Stockholm and to Melbourne, and it is not always clear where the types are. Hooker's herbarium is at Kew, and forms the core of the modern collections there. Harvey's herbarium is still preserved intact. As very little material has been added to it since 1868, it constitutes a time-capsule of the material available to botanists in the mid-nineteenth century, and so can be invaluable in illuminating the species concepts of authors such as Harvey and Sonder.

H.P. LINDER

BASELINE DATA FOR THE VEGETATION OF TWO PROTECTED PLOTS AT THE MATIMBA POWER STATION, ELLISRAS, NW TRANSVAAL

In December 1983 an approximately five hectare study site was enclosed with security fencing for joint research by the Botanical Research Institute and ESCOM. The study site is situated in the north-western corner of the Matimba Power Station terrain, about 15 km west of Ellisras. The site is representative of Acocks's (1975) Mixed Bushveld with a mean annual rainfall of 487 mm.

In February 1984 two structurally representative plots of the vegetation in the study site were selected for long-term monitoring of the floristic composition. Plot no. 1–01/84 represents a closed woodland formation (Edwards 1983) and plot no. 2–01/84 represents an open shrubland formation (Edwards 1983). Plot numbers were allocated by the Secretariat of the National Working Group for Vegetation Ecology. In each of the formation types one 10 m × 10 m plot was permanently demarcated by fencing standards situated at each corner. Rectangularity was obtained with optical squares. Each plot was subdivided into a grid of 100 1m² subquadrats, numbered as indicated in Fig. 1. The presence of all plant species identifiable during sampling, rooted within each subquadrat, was recorded. Voucher specimens were collected outside each plot for all species recorded. Vegetation structure was recorded according to Edwards (1983). Species abundance was calculated as percentage frequency in 100 subquadrats using 10% class intervals. The data were loaded onto the Burroughs B7900 computer of the Department of Agriculture and Water Supply via a Sharp PC1500 portable computer using the PHYTOCAP program (Westfall 1985), and ordered according to frequency and occurrence using the PHYTOTAB program package (Westfall *et al.* 1982). The results of the floristic baseline data are given in Table 1 and structure is illustrated by means of layer diagrams according to Ito (1979). Fig. 2.

TABLE 1.—Baseline data for the two protected plots at the Matimba Power Station, Ellisras, in the form of a two-way matrix, showing floristic composition and percentage frequency. Numbers in brackets are voucher specimens collected by Westfall (PRE)

Floristic composition	Percentage frequency * in protected plot no. 1-01/84	2-01/84
Euclea undulata Thunb. var. *myrtina* (Burch.) Hiern (1617)	8	
Indigofera nebrowniana J.B. Gillet (1616)	7	
Barleria mackenii Hook. (1631)	5	
Cenchrus ciliaris L. (1629)	5	
Talinum crispatulum Dinter ex V. Poelln. (1626, 1632)	5	
Grewia flava DC. (1628)	4	
Boscia foetida Schinz subsp. *rehmanniana* (Pestal) Toelken (1627)	3	
Combretum apiculatum Sond. subsp. *apiculatum* (1621)	3	
Commelina benghalensis L. (1640)	3	
Grewia subspathulata N.E. Br. (1637)	3	
Hibiscus micranthus L. f. (1641)	3	
Schmidtia pappophoroides Steud. (1643)	3	
Talinum arnotii Hook. f. (1636)	3	
Boscia albitrunca (Burch.) Gilg & Ben. (1647)	2	
Cyphostemma puberulum (C.A. Sm.) Wild & Drum. (1639)	2	
Hoffmannseggia burchellii (DC.) Benth. ex Oliv. subsp. *rubroviolacea* (Bak. f.) Brummitt & J.H. Ross (1625)	2	
Monechma divaricatum (Nees) C.B. Cl. (1638)	2	
Ornithogalum seineri (Engl. & Krause) Oberm. (1634)	2	
Spirostachys africana Sond. (1630)	2	
Gisekia pharnaceoides L. (1654)		9
Commelina undulata R. Br. (1660)		7
Acanthosicyos naudiniana (Sond.) C. Jeffrey (1652)		6
Aristida stipitata Hack. subsp. *graciliflora* (Pilg.) Meld. (1669)		6
Rhynchelytrum repens (Willd.) C.E. Hubb. (1653)		6
Cleome rubella Burch. (1657)		5
Indigofera daleoides Benth. ex Harv. var. *daleoides* (1655)		5
Limeum fenestratum (Fenzl) Heimerl (1649)		5
Phyllanthus burchellii Muell. Arg. (1650)		5
Tephrosia purpurea (L.) Pers. subsp. *leptostachya* (DC.) Brummitt (1656, 1665)		5
Acacia tortilis (Forssk.) Hayne subsp. *heteracantha* (Burch.) Brenan (1668)		3
Cyperus margaritaceus Vahl (1662)		3
Felicia mossamedensis (Hiern) Mendonça (1671)		3
Hibiscus meeusei Exell (1659)		3
Pogonarthria squarrosa (Roem. & Schult.) Pilg. (1667)		3
Tribulus terrestris L. (1651)		3
Cassia sp., cf. *C. absus* L. (1664)		2
Waltheria indica L. (1648)		2
Ziziphus mucronata Willd. subsp. *mucronata* (1673)		2
Acacia erioloba E. Mey. (1635)	3	2
Aristida congesta Roem. & Schult. subsp. *congesta* (1619)	3	8
Dichrostachys cinerea (L.) Wight & Arn. subsp. *africana* Brenan & Brummitt var. *africana* (1644)	3	4
Eragrostis lehmanniana Nees var. *chaunantha* (Pilg.) De Winter (1618)	5	8
Grewia retinervis Burret (1633)	5	2
Panicum maximum Jacq. (1666)	8	5
Mariscus chersinus N.E. Br. (1646, 1663)	2	4
Ruellia patula Jacq. (1672)	6	3
Solanum panduriforme E. Mey. (1645, 1661)	2	6
Tragus berteronianus Schult. (1623)	4	3
Urochloa brachyura (Hack.) Stapf (1624)	4	8

* blank = no occurrence; 1 = 1 – 10%; 2 = 11 – 20%; 3 = 21 – 30%; 4 = 31 – 40%; 5 = 41 – 50%; 6 = 51 – 60%; 7 = 61 – 70%; 8 = 71 – 80%; 9 = 81 – 90%; 0 = 91 – 100%

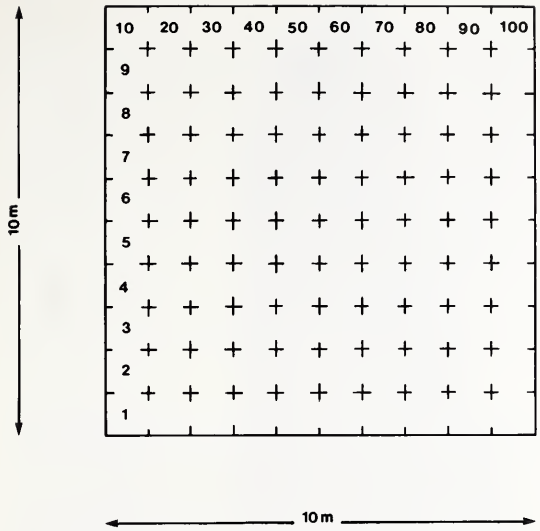

FIG. 1. — A diagrammatic representation of the layout of one of the plots showing numbering of subquadrats.

Changes in floristic composition over time will be shown by means of a temporal classification for each plot. The baseline data show species at a given time. When sampling over a period of time, the species that are present, or have disappeared, or occur throughout that period, can be effectively depicted in the form of a two-way matrix. The repeatability of quantitative, quadrat-derived frequency data together with the concise yet complete depiction of results in a two-way matrix makes this a particularly reliable and sensitive method for determining vegetation change.

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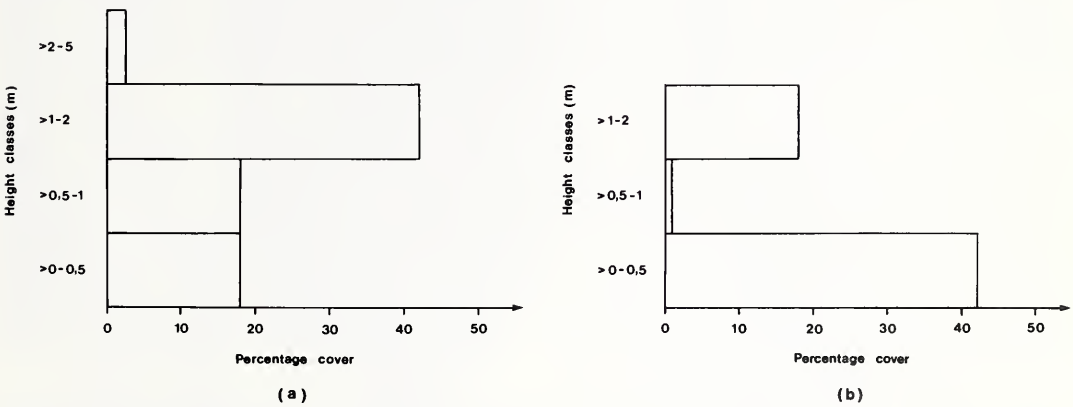

FIG. 2. — The structure of the protected plots at the Matimba Power Station, Ellisras, illustrated by means of layer diagrams showing height classes and percentage cover: a, Plot no. 1-01/84; b, Plot no. 2-01/84.

PLATE. 1. — *Kniphofia splendida* E. A. Bruce.

Bothalia 16,1: 93–96 (1986)

OBITUARY

CYTHNA LINDENBERG LETTY (1895–1985)

With the death of Cythna Letty (Mrs. Forssman) (Fig. 1) in Pretoria at the age of 90 on 3 May 1985, the career of one of South Africa's most distinguished and prolific botanical arists came to an end. She was born in Standerton, Transvaal, on 1 January 1895, the first of five children of the marriage between Walter Edward Letty of Greenwich, England, and Josina Christina Lindenberg of Worcester, Cape Province, who had previously borne six children during her earlier marriage to David Johannes de Vaal Leibbrandt. Figs 2 & 3.

FIG. 1. — Cythna Lindenberg Letty (Mrs Forssman), c. 1945.

In 1899 the family moved to Estcourt in northern Natal where Cythna attended her first of 13 schools and, in 1904, back to Standerton. The delicate and fleeting wild flowers of the veld had fascinated Cythna from her early childhood and it was during her second stay at Standerton that her mother, an able and talented woman, gave Cythna and her younger sister their first lessons in watercolour painting. In 1910 they moved to Heidelberg, Transvaal, where her mother completed a second volume of wild flower paintings. Included are several species which at that time were new to science.

In 1914 Cythna spent her last year of schooling at the Girl's High School, Pretoria, after which she worked as a governess for a short time on the farm Kameeldrift, north-east of Pretoria. One of the paintings she made here, in 1915, is reproduced in Fig. 4. She then trained as a nurse for a year (qualifying as a mid-wife) and as a clerk with the Railways before moving to Cape Town from 1920 to 1924 to assist her brother-in-law, Dr Bösenberg.

Returning to Pretoria in 1925 she received her first appointment in which she could exercise her artistic talent, at the Onderstepoort Veterinary Laboratories. This was before the time of colour photography and she was required to record, for future reference, the appearance of *post mortem* specimens typical of various animal diseases and abnormalities. 'Interesting, if gory, work', she recalls. 'Once, while I was busy drawing an opened-up carcase of a sheep, Dr. Gilles de Kock hurried in with a large bottle of disinfectant to counteract the stench, expecting to find me in a dead faint.'

In 1927 she was transferred to the then Division of Plant Industry under Dr. I. B. Pole Evans where, in the National Herbarium, she started to contribute her superb paintings of African plants which, for many years were the mainstay of the journal *Flowering Plants of Africa*. Some years later Dr. George H. M. Lawrence, director of the then Rachel McMasters Miller Hunt Botanical Library at the Carnegie Institute, Pittsburgh, USA, commented: 'It is

FIG. 2. — Cythna with her mother and father, Johannesburg 1886.

FIG. 3. — Cythna standing at extreme right, front row, with her family, Estcourt 1900.

clear that she stands with the very few among the world's top botanical artists.'

She resigned in 1938 to marry Oscar William Alric Forssman whose grandfather, Chevalier Oscar Wilhelm Alric Forssman had come from Sweden to South Africa in 1844. One son, Bruce, was born in 1940. In 1945 she returned to her post in the National Herbarium and continued working until her final retirement in 1968. During her service she completed over 740 plates for *Flowering Plants of Africa* as well as contributing paintings and black and white illustrations to several other publications of the BRI: *Botanical Survey Memoir* No. 26 (Trees and Shrubs of the Kruger National Park), *Weeds of South Africa* and the Institute's journal *Bothalia*. In 1962 one of her great ambitions was realised when her book *Wild Flowers of the Transvaal* appeared, with 145 plates in colour and the text written partly by herself but largely by other staff members of the BRI. The translation by her cousin Anna Rothman, *Veldblomme van Transvaal*, was the first major illustrated botanical work to appear in Afrikaans.

FIG. 4. — An early study of a Transvaal orchid by Cythna in 1915.

FIG. 5. — A preliminary design for the 50c coin.

FIG. 6. — Cythna Letty, 1978.

When South Africa changed to the decimal system it was decided that the coinage would depict indigenous birds, animals and plants. Cythna was asked to submit several floral motifs and her designs for the 50c (*Strelitzia, Zantedeschia* and *Agapanthus,* representing the orange, white and blue of the South African flag), 20c *(Protea cynaroides* and *P. repens)* and 10c *(Aloe aculeata)* were accepted (Fig. 5). Minting began in December 1964 and the coins were first released in 1965. About the same time she also drew the design of *Gloriosa virescens* for the Rhodesian sixpence, which was minted in 1964.

After her retirement she undertook a revision of *Zantedeschia,* a genus in which she had been interested for many years and for which she had assembled the necessary background information. It was published in *Bothalia* 11: 5–26 (1973), freely illustrated with her own inimitable paintings. Commissions for her paintings, which were then in great demand, kept her occupied but she found time to prepare a number of drawings of indigenous trees which were published in two small books, *Trees of South Africa* in 1975 and *More Trees of South Africa* in 1980.

A project which had been in the back of her mind for some years materialised in her 86th year when 23 paintings of what she called 'strange little flowers' appeared, together with a selection of her poetry which she had jotted down over the years, under the title *Children of the Hours* (1981). Professor Ridley Beeton of the University of South Africa, in an introduction to the book, commented on her 'desire to use words to say things not beyond what she said in her paintings but to explore new routes to perception.' She once said in an interview with a reporter that poetry had been an extension of her paintings, 'I could put only part of my love for flowers into my drawings.'

Volume 30 (1945) of *Flowering Plants of Africa* was dedicated to her 'in grateful recognition of her signal service to South African botany and the art of botanical illustration', but general acknowledgement of her merit came to her only late in life. In 1966 she visited Europe and the United States for the first time when some of her paintings were included in an international exhibition of botanical art held at the Hunt Botanical Institute, Pittsburgh. She repeated the visit in 1970 when she received the Grenfell Silver Medal from the Royal Horticultural Society for an exhibit in London of her paintings of Transvaal wild flowers. In 1974 the University of the Witwatersrand bestowed on her an honorary LI.D. degree in appreciation of 'a lifetime devoted to superb craftsmanship that has assisted our scientific advance

and given joy to so many here and abroad'. In the same year the Johannesburg newspaper *The Star* named her 'Woman of the Year'. She was made a fellow of the American Cactus Society in 1978 and, in 1981, the South African Association of Botanists awarded her their Certificate of Merit for her contributions towards the advancement of botany in South Africa.

She collected about 500 herbarium specimens, including some of the earliest to be recorded from the Kruger National Park during a visit at the invitation of the then Warden, Col. Stevenson Hamilton. Her name is commemorated in the botanical names *Aloe lettyae* Reynolds and *Crassula lettyae* Phillips and in the Cythna Letty Nature Reserve in the mountains near Barberton. Although physically frail in the last years of her life her spirit was unquenchable and, even in her last few months, she was planning for the future, including exploratory enquiries regarding the possibility of reproducing the two volumes of her mother's paintings. Perhaps her life is epitomised in her verse:

I hitched my wagon to a daisy
Direction vague and destination hazy
But,
Could any star have guided
me
more exactly
to where I most dearly loved to be?

L.E. CODD

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E. A. C. L. E. (Ted) Schelpe (1924–1985) — a biography

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Keywords: biography, collecting expeditions, plant collections, publications, Schelpe E.A.C.L.E.

ABSTRACT

Prof. E.A.C.L.E. Schelpe was born in Durban on 27 July 1924 and died in Cape Town on 12 October 1985. He studied at the University of Natal and at Oxford, England. He was awarded an M.Sc. (S. Afr.) for a thesis on the ecology of the Natal Drakensberg and a D. Phil. (Oxon.) for a thesis on the ecology of bryophytes. For a brief period he was Curator of the Fielding Herbarium, Oxford. In 1953 he was appointed Lecturer in Botany at the University of Cape Town, until in 1973 he was awarded a full professorship *(ad hominem)* and the title of Director of the Bolus Herbarium. Here he established a school of taxonomy and promoted 22 theses. His main fields of research were the taxonomy and phytogeography of Pteridophyta (especially African groups) and of Orchidaceae. He has 112 publications to his credit and collected over 7 000 numbers in various regions of Africa, in Europe and the Himalayas. He was a keen gardener and was active in several societies promoting horticulture, orchidology and nature conservation. He was a member of several scientific committees and was repeatedly honoured for his work. Three children were born from his marriage to Sybella Gray, also a botanist.

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PARENTS, EARLY YOUTH AND SCHOOL DAYS

Shipwrecks and disasters at sea have been very much part of the history of southern Africa. One such event had a profound effect on the history and development of botany, not only on this subcontinent but in Africa as a whole.

Edmund and Martha Schelpe, refugees from Belgium during the First World War, were *en route* from England to start a new life in Australia when their ship caught fire near Durban. All the passengers were landed in Durban to await further arrangements for their journey. The couple liked the city and its climate so much that they decided not to go on to Australia but rather to settle in Durban. Their only child was born there on 27th July 1924 and christened Edmund André Charles Louis Eloi — 'Ted' as he later became known.

The Schelpe parents came from the Brugge area of Flanders and had both Flemish and French as home languages. He was a musician and soon obtained a post as organist at the Roman Catholic Cathedral in Durban and later opened his own school of music in that city. Ted's mother, through her background and training in the traditional art of lace-making, taught at the Durban Technical College. In Durban with its subtropical climate she found scope for her interest in plants, awakened in her by her own father's enthusiasm for gardening. It was in this environment that young Ted grew up, attending firstly Marist Brothers's College and then Durban Boys High where he matriculated at the early age of 17.

Ted always remembered the excitement of seeing and collecting his first wild orchid plant at the top of Bain's Kloof Pass while on his way to Cape Town by bus with his father in 1936 when he was only 12 years old. In the same year he wrote a school essay on the perennial theme of 'What do you wish to be when you grow up?'. In that essay he made it quite clear that he was going to be a 'Professor of Botany'.

On visits to the Cape Ted spent much of his time in the municipal botanical gardens where he met the horticultural staff and watched the repotting of greenhouse plants, especially orchids. He also met a Mr Duncan of Jutas, the publishing firm, who was a keen grower of orchids. He spent many hours with this enthusiast at his home chatting about orchids 'over ginger beer and biscuits'. This contact was a significant one because Duncan noted Ted's remarkable memory for plants and later wrote to his father saying that the boy should be given every encouragement to take up botany as a profession.

Prof. Michael Webb of Stellenbosch and Ted Schelpe were contemporaries in their early school days in Durban, both attending Marist Brothers. They lived close to each other and often found themselves walking to school together. One interest they shared was stamp collecting and this brought Michael to the Schelpe home. He remembers the house in Currie Road standing in large, impressive grounds. A fine jacaranda tree in the front garden had numerous exotic orchids attached to it and of these Ted was very proud. Beyond it stood a superb brick and glass conservatory with a spray irrigation system which his parents had built for his orchid collection — and this all while he was still in his early teens. During this period Michael Webb remembers Ted as being a very self-assured and friendly boy, interested mainly in his hobbies: plants and, to a lesser extent, stamps.

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UNIVERSITY OF NATAL AND FIRST EMPLOYMENT

No wonder then that Ted Schelpe went to Pietermaritzburg to enrol at the then Natal University College for a degree in botany. He arrived there in 1941, just after Prof. Adolf Bayer had taken over the department from Prof. John Bews who had become Vice-Principal. In 1943 Ted obtained his B.Sc. degree with distinction in botany, the other major being chemistry. **Fig. 1.**

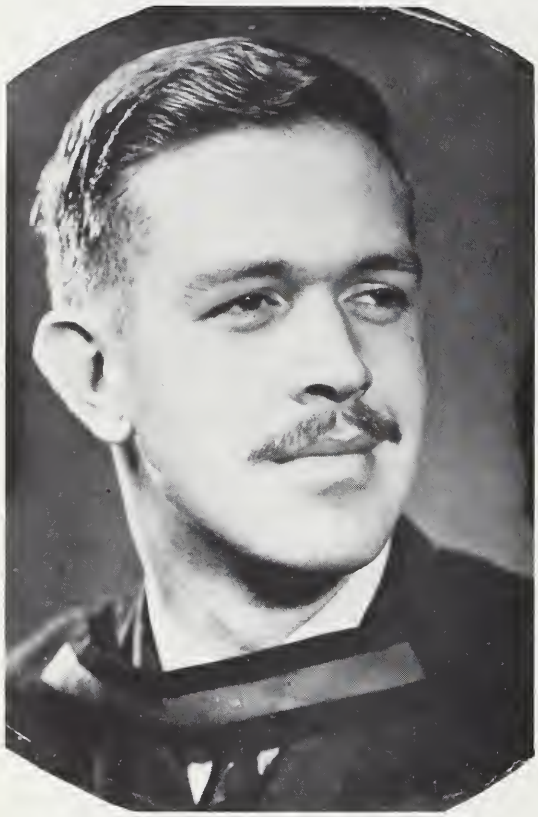

FIG. 1.—B.Sc. graduation, Pietermaritzburg, 1943.

Michael Webb met up with Ted again at university, arriving a year later, so that Ted demonstrated to him in his first year. As a demonstrator he was very helpful but meticulous about details and neatness of anatomical and morphological drawings. Michael also remembers well Ted's pet hate at university — Prof. Bayer's habit of referring to him as 'EAGLE' Schelpe! Michael Webb and several other students remember with great pleasure the excursions which Ted organized for botany and zoology students. (See also the paragraph *Collecting expeditions and collections* below). In December 1943 he took them on a two-week excursion down to Port St Johns, and in December 1944 he organized a major expedition to his favourite stamping ground in the Drakensberg, the Cathedral Peak area. It was obvious to the other students that Ted knew the area and its plants extremely well.

Prof. Olive Hilliard remembers that Ted often rounded up the students on a Saturday, or even a Sunday, and took them out to Town Bush Valley or Chase Valley on the municipal bus to teach them something about the local plants.

Much of the material he collected in Natal was deposited in the Natal University Herbarium which he was paid to look after during his student days. Consequently numerous labels and species covers are written in his hand. Many of his specimens in the herbarium are labelled 'cultivated in Durban', which gives an indication of the large and varied living collection he must have had at home. Ted Schelpe was accepted by the other students as a leader and they regarded him as an authority on a wide range of subjects. Even in those early student days his knowledge of plants and their names appears to have been encyclopaedic.

All of those involved with Ted in his student days have vivid memories of his favourite pastime: yodelling. In the Drakensberg on excursions or in the department while working, he would break into yodelling, which he apparently performed very well. At sports functions in particular, there would be stamping and clapping and cries of 'Schelpe, Schelpe'. This was the signal for him to leap up and yodel. At one of the swimming galas held at the baths at Alexandra Park he chose to stand on the end of the high diving board, the better to be heard. Needless to say, someone crept up behind him and he did an involuntary dive amid mighty cheers and laughter.

During 1944, towards the end of the Second World War, Ted enrolled with the army and was posted to the Aviation Medicine Research Section of the South African Medical Corps in Johannesburg as a laboratory technician. Here he found himself doing numerous uninspiring blood counts. So when volunteers were asked to 'feed' the experimental bedbugs, Ted was prepared to do anything for a change. The trouble came when all his bedbugs died of overdoses of his blood, so back it was to the bloodcounts. His apparent immunity to bedbugs stood him in good stead during the expedition to the Himalayas: when use had to be made of local accommodation he was the only member of the party who slept in peace.

After demobilization at the end of 1945, he went back to university to complete his thesis for the M.Sc. degree. With the strong ecological bias at Pietermaritzburg, and his great interest in the Drakensberg, it is not surprising that he followed an ecological line of research. His dissertation was entitled *The plant ecology of the Cathedral Peak area of the Natal Drakensberg.* The study began in July 1942 while he was still an undergraduate and continued during several subsequent visits to the area in 1943 and 1944. He chose this area because it was, at that time, biotically one of the least disturbed regions of the range. The greater part of the thesis was written while he was serving in the Medical Corps. He obtained his degree, which was conferred by the University of South Africa (Natal was only a College at the time), in 1946. The thesis remains unpublished.

For the first part of 1947 Ted worked at the Royal Natal National Park as horticulturist preparing the place for the visit of King George VI later that year. He was responsible for laying out the gardens

around the hotel which was owned by the Zunckel family. While there, he built up a fine collection of the fauna and flora of the park and prepared an excellent exhibit. This was so admired by Queen Elizabeth that she asked to see the young man, who unprepared for the occasion, was ushered into her presence in boots and khaki workclothes. Ted was most impressed with the way in which she put him at ease.

OXFORD

Late in 1947 he set sail for England. He stopped over in Cape Town and made his first ascent of Table Mountain in the company of Jan Graaff with whom he later teamed up in an expedition to the Himalayas. In Michaelmas term, Ted entered Wadham College to work in the Botany School for the D.Phil. degree under the supervision of the Sherardian Professor, the late T. G. B. Osborn. With his ecological training at Natal University College as background he chose to work on the ecology of lower plants. In Trinity Term (June) 1951 he successfully submitted a thesis entitled *The ecology of Bryophytes on arable land in the Oxford District.* It is surprising that he chose bryophytes as he had not previously shown any special interest in that group. This gave rise to only one short publication, on the techniques for the experimental culture of bryophytes, but this thesis was highly regarded by the late E. F. Warburg, the taxonomist in the Botany School and one of the leading bryologists of his day. A copy of his thesis is still on the open shelves in the Botany School library and shows signs of having been handled frequently.

Ted Schelpe's urge to organize collecting expeditions had not been left behind in Natal, and in 1947 he began planning for a university expedition to Africa (see also *Collecting expeditions and collections* below). He had decided to have a Cambridge botanist in the team and eventually Frank White was provisionally chosen. He was summoned to meet Ted at the Royal Geographical Society's headquarters in Kensington Gore, and so began a life-long friendship. They had received a grant from the University Exploration Society, but on return to Britain found that the expedition was very much in the red. To make up the shortfall they gave numerous lectures, showing the films that had been taken. They also had interviews with the BBC in the very early days of television. Thus they were able to meet their debts and turn the trip into a financial success.

After completing his D.Phil., Ted held a temporary post for a short period as curator of the Fielding Herbarium at Oxford. During his tenure he worked on the ancient herbaria and some recent collections of South American plants. In 1952 he became involved in another collecting expedition, this time a small private one to the Himalayas.

From his expeditions, Ted brought back living plants, mainly orchids, for cultivation in the Oxford Botanic Garden. Some of them still survive. Among them was the attractive epiphytic orchid, *Aerangis rhodosticta* (from Ethiopia). This was exhibited at the Royal Horticultural Society on 17 November 1953 and subsequently became widely grown. The terrestrial orchid, *Eulophia welwitschii,* which he collected at the Ngong Hills in Kenya, received a unanimous Award of Merit at the R.H.S. on 22 May 1951.

Ted came to Oxford with considerable horticultural skills. His techniques for growing orchids were adopted at the Botanic Garden with conspicuous success. It is said that during one year the orchids he had coaxed into bloom could be seen adorning various young ladies at the Commemoration Balls. The story is possibly apocryphal, but it caused him great amusement.

Ted gave tutorials to undergraduates in his rooms at Banbury Road. Many are the times that a fellow lodger heard him droning on about 'a drupe being a true fruit . . .' Like most Oxford students he enjoyed the camaraderie of groups at the local pubs, particularly the Abingdon Arms, where he is known to have done the flower arrangements for the hostess on a number of occasions. He developed a certain sartorial elegance and always referred to his NBPS —navy blue pinstripe suit! This was in strong contrast to his later years when the safari suit (Fig. 2) or sports jacket and baggy grey flannels were very much in evidence. However, one bit of Oxford garb which stayed with him was his academic gown which he referred to as his 'Basuto blanket' at graduation ceremonies.

Ted is remembered in Oxford with affection as a 'character' with a refreshingly original approach to life, a robust sense of humour and infectious laughter. He often took the lead in organizing get-togethers and parties and his hospitality was proverbial. At his rooms in the evenings on most nights of the week one could meet interesting people from all walks of academic and non-academic life. There were nurses, dons, Chinese scholars, archaeologists and even some of the 1951/52 Springbok Rugby Team, Stephen Fry, Ben Myburg and 'Chum' Ochse. Ted would get out his ukelele and they raised the roof with Sarie Marais and other songs, ducking out to the Pheasant nearby for jugs of ale to keep the voices lubricated. When he returned to South Africa his closest friends thought Oxford might never be the same again.

CAPE TOWN: ACADEMIC AND FAMILY LIFE

When he joined the Botany Department at the University of Cape Town in February 1953, Prof. William Edwyn Isaac had just taken over the Department from Prof. Robert Adamson. Ted took over from Audrey Rose-Innes lecturing in general botany, including taxonomy. In 1954 he was promoted to senior lecturer with the sole responsibility of Plant Taxonomy. When Dr Louisa Bolus retired at the end of 1955, after 45 years as Honorary Curator of the Bolus Herbarium, Ted was appointed to the first post of Curator of the herbarium in 1956. In 1968 he was promoted to Associate Professor and in 1973 he was awarded a full professorship *(ad hominem)* and the title of Director of the Bolus Herbarium.

Prof. Schelpe expanded and enriched South African botany by his establishment of a strong plant taxonomy teaching and research school centred in the

FIG. 2. — Among some of the participants of the *Flora of southern Africa* Workshop held at the BRI in January 1982. *Front row* (from left): Ing. P. Bamps, Dr P.H. Raven, Dr B. de Winter, Prof. J.P.M. Brenan; *second row*: Prof. O. Hedberg, Prof. E.A.C.L.E. Schelpe, Mr E.G.H. Oliver, Dr F. Getliffe-Norris, Dr P.J. Cribb, Prof. D. Müller-Doblies; *third row*: Mr R.B. Drummond, Dr O.A. Leistner, Mr L.C. Leach, Dr A.J.M. Leeuwenberg, Dr N.K.B. Robson; *fourth row*: Mr C.H. Stirton, Mr R.O. Moffett, Dr P. Linder, Prof. P.D.F. Kok, Prof. J.J.A. van der Walt, Prof. D.J. Botha, Prof. M.C. Papendorf, Dr D.J.B. Killick. Photo: Adele Romanowski, BRI.

Bolus Herbarium. This is perhaps surprising seeing that he had had no formal training in taxonomy at university.

He took pride in his Oxford approach to tuition for which he said he had to thank Jack Harley. This might have worked in the Oxford environment, but, in my opinion, was not very successful in South Africa. His *modus operandi* was to 'throw a student in at the deep end; and if he sinks then he will be no good, if he swims he'll be a good taxonomist' (some may claim he carried this to extremes). The taxonomy students who did pass through his hands are the following: Associate Prof. A. V. Hall (Assistant Director, Bolus Herbarium), Dr J. P. Rourke (Curator, Compton Herbarium, Kirstenbosch), Dr P. Goldblatt (Curator of African Botany, Missouri Botanic Gardens), Dr J. P. Jessop and Dr H. R. Tölken (formerly Botanical Research Institute and now Curator and Research Officer respectively, State Herbarium, Adelaide, South Australia), E. G. H. Oliver (formerly Curator of National Herbarium, Pretoria and of Government Herbarium, Stellenbosch, now Flora Research Officer, BRI), and Dr H. F. Glen, Dr H. P. Linder and Miss K. L. Immelman (all Flora Research Officers, BRI). A complete list of his post-graduate students and their theses is given below under *Theses of post-graduate students.*

I first met Ted Schelpe when a fellow student, John Jessop, and I, as enthusiastic budding taxonomists, were introduced to the Bolus Herbarium

towards the end of our first year in 1958. We were somewhat overawed by his presence and the atmosphere of the herbarium, but were soon deeply immersed in what the herbarium and its staff had to offer young taxonomists. In post-graduate courses we received no formal lectures from him, and our taxonomy was learnt through experience and knowledge gained by wading through textbooks, literature and specimens, then sharpened and honed during extended tea-time discussions with him in the Bolus Herbarium.

All who have passed through his taxonomy school will remember Schelpe's Law of Taxonomy: 1, taxonomy is easy provided you have insufficient material and no intermediates; 2, it is much easier to describe a new species than to sink an old one; 3, if you cannot key out a species they are in the process of active speciation. Students found that they learned a lot about plants in their excursions with him, whether to the university's field station at Bain's Kloof, up Table Mountain or just in a ramble around the gardens at Kirstenbosch. In post-graduate examinations students were always apprehensive about the unknown flowers that were presented for placing into families, knowing full well that he was always likely to produce a most unusual specimen, often carefully nurtured in his own garden. But his students soon got to know that Prof. Schelpe's bark was worse than his bite; intense discussions were always broken by his quips, followed by his unique laugh, often accompanied by the preening of that elegant R.A.F.-style moustache which he had cultivated since his earliest student days.

On 29 June 1954 Ted Schelpe and Sybella Gray of Simondium, Cape, who was a junior lecturer in the Department at the time, were married in St Michael's R.C. Church, Rondebosch. At Oxford he was known to remark that he would have to find a girl who would make a suitable professor's wife. For those of us who have had the privilege of knowing Ted and Sybella: what better choice could he have made? (Fig. 3). Their's was an exemplary partnership in work, hobby and family life. Their three children, Janette, James and Charles, made Ted and Sybella very proud parents. Now grown up, they have, surprisingly, not followed in the botanical footsteps of their parents, but as Janette put it to me, 'two in the family were quite enough'.

PLANTSMAN AND TEACHER

Ted Schelpe combined his professional scientific interests with a love of growing plants. He was a plantsman in the real sense of the word. As Michael Byren put it 'Ted took great delight in growing as many different plants as possible and, together with Sybella, the garden at their lovely home, Westfield, must bear witness to this passion. I sometimes got the impression that, with that twinkle in his eyes, even the rarest, most beautiful orchid could not compete with a new season's first strawberries or broccoli!'. Undoubtedly one of Ted's greatest joys was his large fine garden in which he spent many happy hours.

This led Ted into his many involvements with amateurs in the south-western Cape, the rest of South Africa and, eventually, the world. In 1957 he was the motivating force, together with the late Dr A. J. Ballantine, in the formation of the Cape Orchid Society (later the Orchid Society of South Africa) which was launched in the Schelpes' flat in

FIG. 3.—Ted and Sybella Schelpe at the Flora Cosmos Exhibition, April 1983. Photo: Cape Times.

Rondebosch. He was President of this Society from 1977 to 1979. He was also founder and President of the Horticultural Council of the Western Cape and Vice-President of the Cape Horticultural Society. Besides his obvious interest in the botany and taxonomy of orchids, he collected and successfully grew orchid plants — species and hybrids — from all parts of the world. He was a leading figure at most World Orchid Conferences.

Ted also took part in the activities of the Botanical Society of South Africa which he joined as a family member in 1960. In 1963 he was elected to its Council on which he served until his death. From 1976–78 he was Chairman of Council and in April 1982 was elected President of the Society. He was consultant, reader and writer of popular scientific articles for its journal, co-author of the first Wild Flower Guide and he acted as tour leader on excursions to southern Namaqualand.

This in turn led him into involvement in the affairs of the National Botanic Gardens, Kirstenbosch. He represented the Botanical Society's Council on the Board of Trustees, firstly as an alternate trustee from 1974–77, then as a full member from 1978–83, and again as an alternate from 1983. During the period 1977–78 he acted as the alternate trustee to the Principal of the University of Cape Town. He also served on the Gardens Scientific Committee and he had recently completed a report for the Trustees on the suitability of sites for the establishment of regional gardens.

In the Botanical and Orchid Societies Ted was a judge at many of the flower shows. In the orchid world he was recognized internationally as a good judge (Fig. 4). Sometimes Ted's directness of comment regarding quality was felt to be harsh but with him true praise was reserved for excellence which, when achieved, he was the first to recognize.

Even though Ted was a professor and renowned botanist, he was able to communicate so well with amateurs, whether at meetings, on outings, at University Summer Schools or in discussion groups at his home. The South African orchid community and members of the Botanical Society have over the years been able to benefit from his vast knowledge and practical experience and for this they are deeply

FIG. 4.—Schelpe examining an undescribed species of orchid, later described as *Disa cardinalis* Linder. January 1980. Photo: Die Burger.

grateful. To many South Africans he was also well known for his appearances on the original radio panel in the series, 'Talking of Nature', chaired by Dr Douglas Hey.

HEALTH AND LAST YEARS

Ted seems to have been bedevilled by the ease with which he contracted chest infections, mostly in the influenza line. He had a rather highly strung nature and was also a heavy smoker for most of his life. At Oxford he was known for worrying about his latest bout of infection following his most recent outing or expedition. He would stalk into the favourite Abingdon Arms during winter evenings, swathed in an overcoat of sombre hue, full of dire foreboding about the particularly virulent strain of flu virus he had just picked up.

One problem which must surely have had a profound effect on Ted Schelpe's whole physical and mental well-being during the last ten years, especially the last year, was the uncertain future of the Bolus Herbarium and with it, his taxonomy school. During the last few years considerable debate had taken place in and out of the University in both official and private circles on the fate of the Herbarium. In 1984 it was eventually removed from the main campus and moved to the City Campus with the 'promise' that this would only be temporary.

He had just completed reading the galley proofs of the Pteridophyta volume for the *Flora of southern Africa,* during a bout of flu, and had had a full morning's happy discussions with orchid enthusiasts at his home, when he died of cardiac arrest during the evening of Saturday, 12th October.

It was a stunned botanical, horticultural and orchid world that learnt of his death via the national news bulletin on the radio the following day.

Many friends and colleagues, botanists and plant lovers payed their last respects to Ted Schelpe at the Requiem Mass held on 18th October in St Michael's R.C. Church, Rondebosch. The pallbearers were his two sons, James and Charles, his nephew, Nicholas Gray, and three of his former students, Anthony Hall, John Rourke and myself. He was buried at a private ceremony in the burial ground of his wife's family at St George's Anglican Church, Groot Drakenstein.

Michael Byren of the Orchid Society, a long-standing friend, included these words in his oration: 'The suddenness of his untimely death has left a numbness which only time will heal. Ted Schelpe has touched all our lives in some way or another. His scientific integrity, his absolute honesty and, most of all, the zest with which he tackled life and living will not be forgotten.'

GRANTS, HONOURS, COMMITTEES

Ted Schelpe held a Nuffield Dominion Travelling Fellowship in 1959 and he received a Bremner Grant from the University of Cape Town in 1966. This enabled him to study primarily pteridophytes, but also Orchidaceae, in overseas herbaria while on sabbatical leave. He was admitted to the Linnean Society in 1949, elected a Fellow of the Royal Society of South Africa in 1969 and a Fellow of the University of Cape Town in 1976. The South African Association of Botanists bestowed its Senior (Silver) Medal on him in 1980. He was a Fellow and Gold Medallist of the Orchid Society of South East Asia and Gold Medallist of the Orchid Society of South Africa and of the Cape Orchid Society. He received a Silver Medal from the Royal Horticultural Society. Two volumes of South African botanical journals have been dedicated to him: Volume 46 of *Flowering Plants of Africa* and Volume 52 of the *South African Journal of Botany.*

Apart from his involvement in committees and societies mentioned in the section *Plantsman and teacher* (above) he was also a member of the Committee on Pteridophyta of the International Association for Plant Taxonomy (since 1964) and of the International Orchid Commission (since 1966) and Chairman of the Commission and of its Committee on Orchid Taxonomy and Nomenclature (since 1975). He also served on the Advisory Committee for Botanical Research to the Minister of Agriculture and Water Supply since its creation in 1975.

FIELDS OF RESEARCH AND PUBLICATIONS

Ted Schelpe's many and varied research and teaching activities are reflected in his publications, both scientific (70) and popular (30), his contributions to conference proceedings (12) and the theses of his post-graduate students (22). (See *List of publications* and *Theses of post-graduate students* below).

His fields of research can be grouped as follows:

1 *Taxonomy of African Pteridophyta*

His main contribution to botanical research has been in the taxonomic study of the African Pteridophyta. The *Flora Zambesiaca* volume (1970) covered the species occurring in Zambia, Mozambique, Zimbabwe, Malawi and Botswana with an update of the revision for the *Flora de Moçambique* assisted by Adelia Diniz in 1979. The Angolan species were covered in the *Conspectus Florae Angolensis* (1977). The Pteridophyta of southern Zaire were covered in his treatment (1974) of the species collected by several Belgian research teams. He also published reviews of seven families of ferns for the whole of Tropical Africa in 1970. With the completion of the pteridophyte volume for the *Flora of southern Africa* due for publication in 1986, he had completed the coverage for southern Africa and most of south central Africa. The co-author of this work is a post-graduate assistant, Mrs Nicola Anthony. Unfortunately he did not have the study leave available to write up the ferns of tropical east Africa. Consequently, after discussion with colleagues in London, he had been persuaded to attempt a conspectus of the Pteridophyta of continental Africa as a basis for future international research.

He was also engaged on scanning electron microscopic studies of fern spores which had revealed the existence of local segregates in some fern species complexes, and on sporangium/spore counts which had provided clues to the distribution of apogamous taxa. Both lines of enquiry he was hoping to pursue on a broader local and continental scale.

2 *Taxonomy of southern African Orchidaceae*

The Bolus Herbarium has been the centre for southern African orchid taxonomy since its foundation by Harry Bolus and the publication of his three volumes covering most of the species then known. Publication of Schelpe's (1966) *'Introduction to the South African Orchids'* served not only to commemorate the centenary of the Bolus Herbarium, but also to promote an interest in this group.

Much of Ted Schelpe's input into the taxonomy of the South African Orchidaceae has been in the form of supervision of the projects and theses of his students. Research by staff and post-graduate students (Hall, Linder, Immelman, Anthony) contributed substantially to *Wild orchids of southern Africa* (1982) edited by Joyce Stewart. The students mentioned have also supplied the manuscripts completed to date for the orchid volume of the *Flora of southern Africa* which is being compiled at present.

Schelpe's personal research was on *Habenaria* and *Bonatea,* started in conjunction with Dr J. Renz of Switzerland, and on overviews and phytogeography of the family. He had also begun to study pollination mechanisms (such as self-pollination) in several genera and was planning to investigate the winter rainfall species of *Disperis* with a post-graduate student. In the interest of the conservation of rare and endangered species in the south-western Cape he had also begun to study the orchids in the Blue Downs area near Kuils River where some 15 species occur in an area zoned for high density housing. Here he was particularly interested in the fire ecology (food reserve metabolism) causing the remarkable flush of flowering following the fire of 1974. The authorities plan to burn the vegetation in this area in February 1986 in the interest of botanical research.

3 *Taxonomy of cultivated species of* Dendrobium

Ted Schelpe's main research interests in Orchidaceae lay in the tropical Asian genera *Paphiopedilum* and *Dendrobium.* Over the past 15 years he had built up and maintained a private living collection of over 100 Asiatic species of *Dendrobium.*

In the light of his constant observation of the species in his glasshouses, he was devising a more workable and more natural classification than the one by Kraenzlin currently in use. He was using vegetative characters (e.g. leaf sheath anatomy and surfaces) together with features of the inflorescence development, neither of which had been used before. He had also observed self-sterility in a number of species rare in cultivation and it had been proposed to pursue this line of research with a view to their possible cultivation. Unfortunately this revision was not completed and is not in a publishable form. All living plants and his notes are being donated to the Royal Botanic Gardens, Kew, by his wife.

4 *Taxonomy and systematics of winter rainfall Scrophulariaceae*

As the volume of the *Flora of southern Africa* on the Pteridophyta had been completed and as work on the volume on Orchidaceae is well advanced, Ted redirected his field work to a study of the two genera, *Nemesia* and *Diascia,* within the winter rainfall region. Preliminary SEM studies of seed surfaces had indicated that they can provide useful taxonomic characters, at least in *Nemesia.* Discovery of two different seed types in populations of *N. anisocarpa* was to receive special attention. As many of the species concerned are semi-desert plants of Namaqualand and Bushmanland, the progress of this project was dependant on adequate rainfall. It is ironic that the best rainfall in living memory fell in much of the area just after he died.

5 *Bryophytes*

Ted maintained an interest in Bryophytes from his Oxford days. He was always interested in collecting species, particularly those ephemeral ones from the drier areas such as Namaqualand. He often found time to curate the collections in the Bolus Herbarium. This side of his interests resulted in several papers and culminated in the checklist of southern African species published jointly with Dr R. E. Magill (1979).

6 Gasteria

His first publication on Angiospermae (1958) had dealt with the succulent genus *Gasteria* of the Liliaceae. He retained an interest in the group over the years and had hoped to co-operate with Ernst van Jaarsveld, the horticulturist in charge of the succulent collections at Kirstenbosch, on a revision of the genus.

COLLECTING EXPEDITIONS AND COLLECTIONS

1942–46 *Drakensberg*

His study of the ecology of the Cathedral Peak area began in July 1942 and continued during subsequent visits in February and July 1943, and in July, September and December 1944. In his thesis he gives a checklist of the flora and notes that all the numbers listed are his own collecting numbers. The lowest number is 52 and the highest 1005. The 14 Fungi and 57 Pteridophyta were given separate numbers prefixed by F and P. A number of species are listed without collecting numbers. A total of 548 species was collected.

The majority of the specimens are housed in the Natal University Herbarium (NU), including some spirit material. The lichen specimens are kept in the Bolus Herbarium with a duplicate set in NU. Duplicates of the angiosperm collections were sent to the National Herbarium, Pretoria (PRE) and the Natal Herbarium, Durban (NH).

Collecting Nos 52–1005 + 71 others. Total: ? 1025 specimens.

1947–50 For this period no collecting registers or records of collecting excursions have been located. He must have collected some specimens while stationed at the Royal Natal National Park in 1947. The specimens that he collected for his study of bryophytes in the vicinity of Oxford must be housed at the Fielding Herbarium (OXF) or at the British Museum (BM).

1949 *Mt Kenya* July–October 1949

He organized and led the Oxford University Mount Kenya Expedition which went under the auspices of the University's Exploration Society. The team consisted of four persons, Ted Schelpe and Frank White as the botanists, John Riley, medical student, amateur entomologist and son of the Keeper of Entomology at the British Museum as the zoologist and A. C. Allison (now a professor) as anthropologist. They covered all the vegetational zones of the mountain, getting up to 10 000 ft at the Kathita Ford on the Kathita River and 10 500 ft in the Sagana Valley, according to his collecting register, but 15 000 ft from his observations in the paper on the pteridophyte ecology.

All specimens collected are housed in the British Museum (BM). Ted collected mainly orchids and cryptogams while Frank White concentrated on the montane rain forests of the SE slopes.

Collecting Nos 2373–2922. Total: 550 specimens.

1951 *Drakensberg* 4 November 1952 – 6 January 1952

During the Oxford University winter vacation he returned to Durban to see his parents and while there made several trips to the Drakensberg to visit his old hunting grounds.

Collecting Nos 2923–3157. Total: 235 specimens.

1952 *Himalayas* 18 June–23 August 1952

After completing his work in the Fielding Herbarium he joined a climbing party to the Kangra Himalayas. The other members were Ken Snelson of the Sudan Civil Service, who had made the first ascent of Mpongwane in the Natal Drakensberg while on leave from the Royal Navy at the end of World War II, and Jan Graaff who was then lecturing at Cambridge.

He arranged a small grant from the British Museum and sailed to India with a formidable number of large collecting boxes, iron-clad and virtually weatherproof with BM engraved all over them. He arrived with Snelson in Bombay on 18 May 1952 and set off on the Frontier Train to Delhi with 20–30 maunds of kit (1 maund = ±30 kg). From Delhi they caught the Kashmir Mail and then a bus to Manali. Here they joined up with Jan and five Sherpas, 45 porters and 17 mules. His BM boxes were loaded onto mules; one on either side made a full load for a mule.

Then began the long hike up the Beas River Valley to set up the base camp. *En route* Ted collected while the others reconnoitred routes over the Parbati. Base camp was finally set up at 12 800 ft in the Dibibokri Nal, upper Kulu Valley. Ted Schelpe's main interest in collecting was ferns and orchids, but he also studied the mosses and lichens and collected all other plants, from the commonest ranunculus and omnipresent primulas to the rare blue meconopsis. Plants were not his only concern, animals of all forms were assiduously collected, prepared and put into the boxes: lizards and beetles, insects attracted to the candles at night, butterflies, and snails, boiled and cleaned. In his diaries he noted that chasing butterflies at this altitude was an energetic occupation; also that when he returned to camp one evening he found the remaining Sherpas had taken up catching butterflies for him. Carpenter bees fascinated him by their frequent visits to the populations of fritillaries.

Most of his collecting was done around the base camp with short sorties together with a Sherpa to places farther afield and at higher altitudes, one such being to the Dibibokri Glacier at 14 000 ft where he noted insects in the snow. He accompanied the others on one major climb, the first ascent of a small peak of 19 200 ft above the Ratiruni Glacier and collected lichens from the summit rocks. He made a special note of the rapidity with which new species came into flower in the places that he visited several times. He also set out some transects near camp in a lichen survey, mainly of umbilicarias.

Ted was absolutely tireless as a collector even when the weather was bad and always immensely cheerful about his 'chores'. Much of the sojourn in the Kangra covered the very beginning of the monsoon period. Wet rainy squalls were therefore frequent, no doubt making pressing and drying of specimens extremely difficult.

As Jan Graaff recalls 'Ted really made base camp into a home for us and his welcome after we had been away for a few days on a climbing trip was always something we looked forward to. To reward us for helping him change drying papers, Ted used to give continuous, free and fascinating 'nature study lessons' in base camp. We loved them, but were unable to remember a tenth of what he told us'.

Ted left the party towards the end of July and went to the eastern Himalayas in Assam in search of forest plants. He gave the others, who went into Tibet, a couple of BM boxes just in case they saw something. 'It was then' said Jan Graaff 'that we really appreciated how hard he had been working and that collecting for a BM box was no light task under expedition conditions'.

From 6–7 August Ted was in Delhi and visited the renowned embryologist Prof. Maheshwari. He gave a lecture there on the ecology of ferns, bryophytes and lichens. He then went by plane to Kalinjorg and by car to Dajeerling where he stayed from 14–23 August collecting in the area. He was a frequent visitor to the Lloyd Botanic Gardens there, where the curator was a Mr J. Hulbert, and to the orchid nursery of Ghose & Co. He left India by boat from Calcutta where he claimed he played his last game of rugby!

Collections: Angiospermae, 190; Pteridophyta, 173; Musci, 62; Hepaticae, 4; Lichenes, 72.

Collecting Nos 3158–? 3618 (some 20 collections with a & b numbering). Total: 501 specimens.

1952 *Ethiopia* September 1952

At the beginning of September he disembarked at Aden to take up the open invitation he had received from the British Consul to Ethiopia, Lt Col. A. C. Curle, whom he had met on the boat trip to India.

In the course of this visit a number of different vegetation types in the provinces of Shoa and Arussi were studied, and particular attention was paid to the pteridophytes.

He visited Mulu Sayu, the crater lake at Bichoftu and Boli Gorge with the Mugher River, the Entoto Range and to the south Lake Shala, Neghelli, Sheshemana and Cofole.

Collections: Aden: marine algae, 5; Ethiopia: Angiospermae, 86; Pteridophyta, 55.

Collecting Nos ? 3619–3744. Total: 146 specimens.

1953 *Cape Peninsula* 29 March 1953

With his appointment at the University of Cape Town he began collecting in the vicinity starting from Collecting No. 3745.

1953 *Rhodesia [Zimbabwe]* 27 June–21 July 1953

He went to the Congress of the S.A. Association for the Advancement of Science (S_2A_3) held in Bulawayo with Dr Margaret Levyns and Mr J. E. P. Levyns. They visited the Matopos, Victoria Falls, Fort Victoria and the eastern highlands making collections *en route*.

Collecting Nos 3906–4130. Total: 124 specimens.

1954 *Mozambique* January 1954

A team of biologists, mainly zoologists under the leadership of Prof. J. H. O. Day of UCT, went to study estuarine ecology in the Marumbei estuary just north of Inhambane. Ted Schelpe accompanied them as botanical advisor. He found very little of value within his sphere of interests.

1954 *South West Africa* 7 June – 22 July 1954

To increase his knowledge of southern African ferns he undertook a collecting trip to this territory during the winter vacation, accompanied by his new wife. They travelled along a route from Goodhouse through Warmbad, Karasberg, Windhoek, the Waterberg, Etosha and back.

Collecting Nos 4756–4848. Total: 92 ferns.

1955 *Rhodesia [Zimbabwe] & Mozambique* 24 June – 16 July 1955

During the course of preliminary work on the Pteridophyta, it became clear to Ted from the few records from Gorongoza Mountain that this massif should support a varied pteridophyte flora. Consequently an expedition to the eastern districts of Zimbabwe was extended to include Gorongoza. He was accompanied by his wife and the zoologist, Dr Richard Liversidge.

The mountain was approached from Vila Paiva d'Andrade. First camp was established on the southern slopes at Morambodzi Waterfall at 2 700 ft in riverine forest. A high camp was pitched close to Gogogo Peak at 5 800 ft, the highest point of the mountain. He collected 70 ferns there.

The other areas visited were Pungwe Gorge, Odzani River, Jaegersberg, Chipungu Falls, Stapleford, Penhalonga and Vumba.

Collections: Pteridophyta, 376; Bryophyta, 74; Lichenes, 24; Angiospermae, 7; by Mrs Schelpe, 271.

Collecting Nos 5301–5775b. Total: ? 475 specimens.

1962 *N Mozambique* 16 June – 29 July 1962

To establish the identity of previously collected material and extend the survey of the distribution of pteridophytes in northern Mozambique for the Flora Zambesiaca an expedition was undertaken with Mr L. C. (Larry) Leach. They entered Mozambique through Mandimba from Malawi and followed the road to Nampula, collecting intensively on Ribaué Mountain and investigating large and small granite domes along the route. On the return journey the party turned south through Lioma to collect on Namuli Mountain (Serra de Gurué). They made 24 new records for Ribaué, 33 for Namuli and increased the number of ferns recorded for the area from 55 to 80 including 2 new species.

Collecting Nos 6700–7095. Total: 395 specimens.

1969 *New Guinea* 20 Sept. & 25 Oct. 1969

Collections were made on the pre- and post-congress tours held in conjunction with the 6th World Orchid Conference, Sydney. No records of any collections could be found in his registers.

1978 *NW Thailand* 24–27 Jan. 1978

After the 9th World Orchid Conference he joined a group of orchidologists including Dr Phillip Cribb of Kew on a collecting expedition in the north-west provinces of Thailand. No records of any collections could be found in his registers.

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GLEN, H.F. 1974. *A revision of the Gibbaeinae (Mesembryanthemaceae).*
FLACH, T.P. 1978. *Studies on the autecology of* Myriophyllum aquaticum *in the SW Cape Province.*
IMMELMAN, K.L. 1979. *A revision of the South African species of* Holothrix *Rich. ex Lindl. (Orchidaceae).*
FANSHAWE, N.C. 1980. *A revision of the Southern African species of Polytrichaceae (Musci).*
ANTHONY, N.C. 1983. *A revision of the Southern African species of* Cheilanthes *Sw. and* Pellaea *Link. (Pteridaceae).*
LLOYD, J.W. 1985. *A plant ecological study of the farm 'Vaalputs', Bushmanland, with special reference to edaphic factors.* (Co-promoter: Prof. A.O. Fuller, Geology).

PLANTS NAMED AFTER SCHELPE

Lichenes:	*Parmelia schelpei* Hale
Musci:	*Leucoloma schelpei* P. Varde
	Fissidens schelpei P. Varde
Pteridophyta:	*Marsilea schelpeana* Launert
	Osmunda schelpei Bobrov
Angiospermae:	*Aloe schelpei* Reynolds

ACKNOWLEDGEMENTS

In compiling this biography and appreciation of Ted Schelpe I have received invaluable assistance from the following: Mrs Sybella Schelpe, Dr Jan Graaff and Mr Michael Byren (Cape Town), Mr Frank White (Oxford), Mr Oliver Kerfoot (Johannesburg), Prof. Olive Hilliard (Pietermaritzburg), Prof. Michael Webb (Stellenbosch), the Bolus Herbarium of the University of Cape Town, and the Botanical Society of South Africa, all of whom I would like to thank most sincerely. Their willingness to provide background information and reminiscences is gratefully acknowledged.

UITTREKSEL

Prof. E.A.C.L.E. Schelpe is op 27 Julie 1924 in Durban gebore en op 12 Oktober 1985 in Kaapstad oorlede. Hy het aan die Universiteit van Natal en in Oxford, Engeland studeer. Hy het 'n M.Sc. (S. Afr.) verwerf vir 'n tesis oor die ekologie van die Natalse Drakensberg en 'n D.Phil. (Oxon.) vir 'n tesis oor die ekologie van briofiete. Hy was vir 'n kort tydperk Kurator van die Fielding-herbarium, Oxford. In 1953 is hy as Lektor in Plantkunde aan die Universiteit van Kaapstad aangestel, totdat hy in 1973 'n volle professoraat (ad hominem) *en die titel van Direkteur van die Bolus-herbarium ontvang het. Hier het hy 'n skool in taksonomie tot stand gebring en as promotor vir 22 tesisse opgetree. Sy belangrikste navorsingsvelde was die taksonomie en fitogeografie van Pteridophyta (veral groepe in Afrika) en van Orchidaceae. Hy het 112 publikasies tot sy krediet en het meer as 7 000 nommers in verskeie streke van Afrika, in Europa en die Himalaja versamel. Hy was 'n ywerige tuinier en was aktief in verskeie verenigings wat tuinbou, orgideëkunde en natuurbewaring bevorder het. Hy was lid van verskeie wetenskaplike komitees en is herhaaldelik vir sy werk vereer. Drie kinders is uit sy huwelik met Sybella Gray, ook 'n plantkundige, gebore.*

Bothalia 16,1: 109–118 (1986)

New taxa, new records and name changes for southern African plants

STAFF OF THE NATIONAL HERBARIUM

ABSTRACT

Alterations to the inventory maintained in PRECIS for bryophytes, pteridophytes and monocotyledons are reported for the year 1985. There are 111 newly described taxa, eight taxa newly reported for southern Africa and 284 name changes. The total of 403 alterations represents over 6% of the total taxa in these plant groups.

INTRODUCTION

The objective of this series is to allow all users of plant names in southern Africa to keep up to date with recent research that has resulted in additions or changes to the complete inventory of southern African plant taxa recorded in the computer system PRECIS. The format is that of the second edition of the *List of species of southern African plants* (Gibbs Russell *et al.*, 1985 and in preparation), and the changes reported here thus keep the *List of species* up to date. This particular report covers only the cryptogams and monocotyledons. The dicotyledons will be covered in full through 1985 in Part 2 of the second edition of the *List of species*, which will go to press within the next few months.

The list presented here is impressive because of its length: during 1985, 403 alterations have been made to plant names in the cryptogams and monocotyledons alone, representing about 6% of the total taxa involved. There have been 111 new taxa described, 8 taxa newly recorded for southern Africa, and 284 name changes that have resulted from new taxonomic interpretations or application of the rules of nomenclature.

It is gratifying that so much research has reached completion. However, it is sobering to contemplate the amount of work required to implement the results, through taking up the most recently applied names both in allied research and in herbarium curation.

Keeping up to date with the application of plant names is expensive in terms of the publications that must be purchased to cover southern African taxa adequately, and also in terms of the expert manpower needed to scan the literature for relevant articles and evaluate the results. While these annual publications of additions and changes reported through PRECIS should simplify the work of individual researchers and smaller herbaria, alterations on the scale reported here are bound to be costly and troublesome. Names on herbarium specimens must be re-written, manuscripts must be checked and edited, and computerized information must be updated. Even worse, previous publications in which these taxa appear will be out of date, and the names must be checked before being reliably used. At least, the computerization of our plant inventory has allowed us for the first time to obtain an overview of the magnitude of these tasks.

The previous annual list of name changes was published in *Bothalia* 15: 751–759 (1985). The complete and up-to-date listing of names, literature and useful synonyms for all of the ± 24 000 taxa of southern African plants is continuously maintained as part of PRECIS. Printout for any family or genus can be supplied by the Botanical Research Institute on request.

Families and genera are in the order of Dyer (1975, 1976) and species are in alphabetical order. A name in current use appears in capital letters with its PRECIS number. Synonyms appear in lower case letters and each synonym is entered twice, once indented below the name for which it is a synonym and once in its alphabetical place in the genus. New records are indicated by quoting a specimen and its locality. Naturalized taxa are shown by an asterisk following the name.

The following staff members have contributed to this list: J. van Rooy, Bryophyta; C. Reid, Pteridophyta and all Monocotyledonae except Poaceae; L. Smook, Poaceae.

G. E. GIBBS RUSSELL

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                BRYOPHYTA  (Contributed by J. van Rooy)

DICRANACEAE  (8)                                              13S6

  13S9   -CAMPYLOPUS BRID.
              2. FRAHM. 1984. NOVA HEDWIGIA 39: 591.
           C. ampliretis (C. Muell.) Par. =  C. FLACCIDUS
           C. edwardsii Sim =  C. FLACCIDUS
    800    C. FLACCIDUS BEN. & CAPD.
                  (=C. ampliretis (C. Muell.) Par.) 2
                  (=C. edwardsii Sim) 2
                  (=C. heteroneurum Ther.) 2
                  (=C. olivaceonigricans (C. Muell.) Par.) 2
                  (=Thysanomitrion transvaaliense Herz. &
                        Dix. ex Sim) 2
           C. heteroneurum Ther. =  C. FLACCIDUS
           C. olivaceonigricans (C. Muell.) Par. =  C.
                        FLACCIDUS

  1367   -Thysanomitrion Schwaegr. =  CAMPYLOPUS
           T. transvaaliense Herz. & Dix. ex Sim =
                        CAMPYLOPUS FLACCIDUS

  1370   -CHORISODONTIUM (MITT.) BROTH.
              1. MAGILL. 1981. FSA.
    100    C. FALCATUM MAGILL

POTTIACEAE  (14)                                              1401

  142S   -TORTULA HEDW.
              2. MAGILL, DELGADILLO & STARK. 1983. ANN.
                        MO. BOT. GDN 70: 200.
    600    T  CHISOSA MAGILL DELGADILLO & STARK 2

SPLACHNACEAE  (21)                                            1491

  1491   -TAYLORIA HOOK.
              1. MAGILL. IN PRESS. FSA.
    300    T. ORTHODONTA (P. BEAUV.) WIJK & MARG.

BRYACEAE  (24)                                                1506

  1S06   -ANOMOBRYUM SCHIMP.
              2. VAN ROOY. 1986. BOTHALIA.
     25    A. DRAKENSBERGENSE VAN ROOY 2

  1S08   -BRYUM HEDW.
              2.  MAGILL. IN PRESS. FSA.
    200    B. ALPINUM HUDS. EX WITH.
                  (=Pohlia simii Schelpe) 2
           B. argenteum Hedw. var. rotundifolium Sim = B.
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CELLULARE
B. brachymeniaceum C. Muell. = B. PSEUDO-TRIQUETRUM
800 B. CANARIENSE BRID.
(=B. mundtii C. Muell.) 2
(=B. pervirens C. Muell.) 2
950 B. CELLULARE HOOK.
(=B. argenteum var. rotundifolium Sim) 2
B. mundtii C. Muell. = B. CANARIENSE
1450 B. PAPPEANUM C. MUELL.
B. pervirens C. Muell. = B. CANARIENSE
1650 B. POLYTRICHOIDEUM C. MUELL.
1675 B. PRIONOTES SHAW
1800 B. PSEUDOTRIQUETRUM (HEDW.) GAERTN., MEYER & SCHERB.
(=B. bracymeniaceum C. Muell.) 2
2000 B. RADICULOSUM BRID.
(=?B. subdecursivum C. Muell.) 2
B. subdecursivum C. Muell. = B. RADICULOSUM
2175 B. TRANSVAALO-ALPINUM C. MUELL.

1515 -POHLIA HEDW.
P. simii Schelpe = BRYUM ALPINUM HUDS. EX WITH.

RHIZOGONIACEAE (32) 1556

1555 -PYRRHOBRYUM MITT.
1. MAGILL. IN PRESS. FSA.
100 P. SPINIFORME (HEDW.) MITT.
(=Rhizogonium spiniforme (Hedw.) Bruch ex Krauss) 1
200 P. VALLIS-GRATIAE (HAMPE) MANUEL
(=Rhizogonium vallis-gratiae (Hampe) Hampe ex Jaeg.) 1

1556 -Rhizogonium Brid. = Southern African species moved to PYRRHOBRYUM
R. spiniforme (Hedw.) Bruch ex Krauss = PYRRHOBRYUM SPINIFORME
R. vallis-gratiae (Hampe) Hampe ex Jaeg. = PYRRHOBRYUM VALLIS-GRATIAE

PTERIDOPHYTA (Contributed by C. Reid)

SELAGINELLACEAE 30

30 -SELAGINELLA BEAUV.
4. ANTHONY & SCHELPE. 1985. CHECKLIST. BOTHALIA 15: 541.
400 S. KRAUSSIANA (KUNZE) A. BR. EX KUHN (Note author change)
550 S. NJAM-NJAMENSIS HIERON.

ISOETACEAE 40

40 -ISOETES L.
4. ANTHONY & SCHELPE. 1985. BOTHALIA 15: 555.
100 I. CAPENSIS OUTHIE VAR. CAPENSIS
150 I. CAPENSIS OUTHIE VAR. STEPHANSENII (OUTHIE) SCHELPE & N.C. ANTHONY
(=I. stephansenii Outhie) 4
I. stephansenii Outhie = I. CAPENSIS VAR. STEPHANSENII

ADIANTACEAE 280

340 -CHEILANTHES SWARTZ
5. ANTHONY. 1984. CONTR. BOLUS HERB. 11.
6. JACOBSEN & JACOBSEN. 1985. S. AFR. J. BOT. 51: 145.
100 C. BERGIANA SCHLECHTD. 5
250 C. CONCOLOR (LANGSD. & FISCH.) R. & A.F. TRYON 5
300 C. CONTRACTA (KUNZE) METT. EX KUHN 5
850 C. HYALOGLANDULOSA W. & N. JACOBSEN 6
1160 C. INVOLUTA (SWARTZ) SCHELPE & N.C. ANTHONY VAR. OBSCURA (N.C. ANTHONY) N.C. ANTHONY 5
(=C. viridis (Forssk.) Swartz var. obscura N.C. Anthony) 5
C. viridis (Forssk.) Swartz var. obscura N.C. Anthony = C. INVOLUTA VAR. OBSCURA

380 -PTERIS L.
4. ANTHONY & SCHELPE. 1985. CHECKLIST. BOTHALIA 15: 541.
550 P. TREMULA R. BR. *

POLYPODIACEAE 410

450 -PLEOPELTIS H. BK. EX WILLD.
200 P. MACROCARPA (BORY EX WILLD.) KAULF.
P. macrocarpa (Bory ex Willd.) Kaulf. forma sinuata (Sim) Schelpe = X PLEOPODIUM SIMIANUM

455 -X PLEOPODIUM SCHELPE & N.C. ANTHONY
1. ANTHONY & SCHELPE. 1985. BOTHALIA 15: 555.
100 P. SIMIANUM SCHELPE & N.C. ANTHONY
(=Pleopeltis macrocarpa (Bory ex Willd.) Kaulf. forma sinuata (Sim) Schelpe) 1

THELYPTERIDACEAE 532

532 -THELYPTERIS SCHMIDEL
5. ANTHONY & SCHELPE. 1985. CHECKLIST. BOTHALIA 15: 541.
900 T. PULCHRA (BORY EX WILLD.) SCHELPE

ASPIDIACEAE 590

605 -CYRTOMIUM PRESL
1. ANTHONY & SCHELPE. 1985. CHECKLIST. BOTHALIA 15: 541.
#. PRE HEPBARIUM PRACTICE, FOLLOWING ANTHONY & SCHELPE.
100 C. CARYOTIDEUM (WALL. EX HOOK. & GREV.) PRESL VAR. MICROPTERUM (KUNZE) C. CHR.
(=Phanerophlebia caryotidea (Wall. ex Hook. & Grev.) Copel. var. micropteris (Kunze) Tardieu) #

640 -Phanerophlebia Presl = CYRTOMIUM
P. caryotidea (Wall. ex Hook. & Grev.) Copel.
var. micropteris (Kunze) Tardieu = CYRTOMIUM CARYOTIDEUM VAR. MICROPTERUM

650 -POLYSTICHUM ROTH
4. ANTHONY & SCHELPE. 1985. BOTHALIA 15: 555.
320 P. MONTICOLA N.C. ANTHONY & SCHELPE
(=P. PUNGENS SENSU SIM) 4
P. pungens sensu Sim = P. MONTICOLA
(Note : P. pungens (Kaulf.) Presl remains as is).

680 -WOODSIA R. BR.
4. ANTHONY & SCHELPE. 1985. CHECKLIST. BOTHALIA 15: 541.
50 W. ANGOLENSIS SCHELPE

BLECHNACEAE 690

690 -BLECHNUM L.
5. ANTHONY & SCHELPE. 1985. BOTHALIA 15: 555.
150 B. AUSTRALE L. VAR. ABERRANS N.C. ANTHONY & SCHELPE
150 B. AUSTRALE L. VAR. AUSTRALE

ANGIOSPERMAE

MONOCOTYLEDONAE (Contributed by C. Reid)

POACEAE (Contributed by L. Smook) 9900010

9900341 -OXYRHACHIS PILG.
100 O. GRACILLIMA (BAK.) C.E. HUBB.
Tropical African species collected in Natal. 3030 (Port Shepstone): Port Shepstone (-CB), Huntley 791.

9900380 -MISCANTHUS ANDERSS. Revision: G.E. Gibbs Pussell (PRE).
1. PILGER. 1940. PFLANZENFAM. 114E: 113.
2. LAUNERT. 1970. FSWA.
3. CLAYTON & RENVOIZE. 1982. FTEA.
500 M. JUNCEUS (STAPF) PILG.
(=Miscanthidium teretifolium (Stapf) Stapf) 2,3

9900400 -Miscanthidium = MISCANTHUS
M. teretifolium (Stapf) Stapf = MISCANTHUS JUNCEUS

9900680 -SCHIZACHYRIUM NEES
350 S. RUPESTRE (K. SCHUM.) STAPF
Tropical African species collected in Natal. 2832 (Mtubatuba): Lake St. Lucia, eastern shores (-AD), Ellis 4497.

9901040 -BRACHIARIA GRISEB.
2. CLAYTON & RENVOIZE. 1982. FTEA.
1520 B. RAMOSA (L.) STAPF 2
Tropical Africa to tropical Asia,
recorded for Transvaal.

9901160 -PANICUM L.
1500 P. GENUFLEXUM STAPF
East tropical African species collected in Natal. 2832 (Mtubatuba): Lake St. Lucia, eastern shores.
3850 P. REPENTELLUM NAPPER
East tropical African species collected in Botswana and Transvaal. 1923 (Maun): Moremi Game Reserve (-AB), P.A. Smith 1952. 2528 (Pretoria): Warmbaths (-AC), Smook 1968.

9902830 -SPOROBOLUS R. BR.
2600 S. PELLUCIDUS HOCHST.
East tropical African species collected in S.W.A./ Namibia. 1915 (Okaukuejo): Ombika, Ethosha National Park (-BO), Giess & Loutit 14102.

9903990 -Lasiochloa = TRIBOLIUM
L. echinata (Thunb.) Adamson = TRIBOLIUM ECHINATUM
L. longifolia (Schrad.) Kunth = TRIBOLIUM HISPIDUM
L. obtusifolia Nees = TRIBOLIUM OBTUSIFOLIUM
L. utriculosa Nees = TRIBOLIUM UTRICULOSUM

9904020 -Plagiochloa = TRIBOLIUM
P. acutiflora (Nees) Adamson & Sprague = TRIBOLIUM ACUTIFLORUM
P. alternans (Nees) Adamson & Sprague = TRIBOLIUM ALTERNANS
P. brachystachya (Nees) Adamson & Sprague = TRIBOLIUM BRACHYSTACHYUM
P. ciliaris (Stapf) Adamson & Sprague = TRIBOLIUM CILIARE
P. oblitera (Hemsl.) Adamson & Sprague = TRIBOLIUM OBLITERUM
P. uniolae (L. f.) Adamson & Sprague var. uniolae = TRIBOLIUM UNIOLAE
P. uniolae (L. f.) Adamson & Sprague var. villosa (Stapf) Adamson = TRIBOLIUM UNIOLAE

9904021 -TRIBOLIUM OESV.
1. RENVOIZE. 1985. KEW BULL. 40: 795.
100 T. ACUTIFLORUM (NEES) RENVOIZE
(=Plagiochloa acutiflora (Nees) Adamson & Sprague) 1
200 T. ALTERNANS (NEES) RENVOIZE
(=Plagiochloa alternans (Nees) Adamson & Sprague) 1
300 T. AMPLEXUM RENVOIZE
400 T. BRACHYSTACHYUM (NEES) RENVOIZE
(=Plagiochloa brachystachya (Nees) Adamson & Sprague) 1
500 T. CILIARE (STAPF) RENVOIZE
(=Plagiochloa ciliaris (Stapf) Adamson & Sprague) 1
600 T. ECHINATUM (THUNB.) RENVOIZE
(=Lasiochloa echinata (Thunb.) Adamson) 1
700 T. HISPIDUM (THUNB.) RENVOIZE
(=Lasiochloa longifolia (Schrad.) Kunth) 1
800 T. OBLITERUM (HEMSL.) RENVOIZE
(=Plagiochloa oblitera (Hemsl.) Adamson & Sprague) 1
900 T. OBTUSIFOLIUM (NEES) RENVOIZE
(=Lasiochloa obtusifolia Nees) 1
1000 T. UNIOLAE (L. F.) RENVOIZE
(=Plagiochloa uniolae (L. f.) Adamson & Sprague var. uniolae) 1
(=Plagiochloa uniolae (L. f.) Adamson & Sprague var. villosa (Stapf) Adamson) 1
1100 T. UTRICULOSUM (NEES) RENVOIZE
(=Lasiochloa utriculosa Nees) 1

99042S0 -PSEUDOBROMUS K. SCHUM.
1. CHIPPINDALL. 1955. GR. & PAST.
2. CLAYTON. 1985. KEW BULL. 40: 727.
100 P. SILVATICUS K. SCHUM. 1

9904280 -BROMUS L.
112S B. RIGIDUS ROTH
European and north African species collected in S.W. Cape. 3318 (Cape Town): Farm Barenskop (-AB/BA), M.P. Fourie PRE 34

CYPERACEAE 4S2000

0459000 -CYPERUS L.
5. HOOPER. 1972. FWTA.
9. GETLIFFE & BAIJNATH. 1976. JL S. AFR. BOT. 42:273.
1000 C. CUSPIDATUS KUNTH
(=C. uncinatus Poir.) 5
5550 C. PROLIFER LAM.
(=C. prolifer Lam. var. isocladus (Kunth) Kukenth.) 9
C. prolifer Lam. var. isocladus (Kunth) Kukenth. = C. PROLIFER
C. uncinatus Poir. = C. CUSPIDATUS

0459010 -PYCREUS BEAUV.
S. NAPPER. 1972. FWTA.
250 P. ATRIBULBUS (KUKENTH.) NAPPER (Note author change)
1100 P. MACRANTHUS (BOECK.) C.B. CL. (Note author change)
2000 P. PUMILUS (L.) NEES S (Note author change)

0465000 -FICINIA SCHRAD. Revision: T.H. Arnold & C. Reid (PRE).
##. PRE HERBARIUM PRACTICE, FOLLOWING ARNOLD.
20S0 F. OISTANS C.B. CL. ##

0467000 -FUIRENA ROTTB.
3. FORBES. 1984. S. AFR. J. BOT. 3: 359.
12S0 F. TENUIS P.L. FORBES

0468020 -ISOLEPIS R. BR.
##. PRE HERBARIUM PRACTICE, FOLLOWING FELLINGHAM.
11S0 I. TRACHYSPERMA NEES ##

0471000 -FIMBRISTYLIS VAHL
F. hispidula (Vahl) Kunth = BULBOSTYLIS HISPIOULA

0471010 -BULBOSTYLIS KUNTH
4. GOETGHEBEUR & COUOIJZER. 1985. BULL. JARD. BOT. NAT. BELG. 55: 207.
770 B. HISPIDULA (VAHL) R. HAINES 4
(=Fimbristylis hispidula (Vahl) Kunth) 4
1050 B. PARVINUX C.B. CL. 4
(=Abildgaardia parvinux (C.B. Cl.) K. Lye) 4
1150 B. SCLEROPUS C.B. CL. 4

0471020 -ABILOGAAPOIA VAHL
A. parvinux (C.B. Cl.) K. Lye = BULBOSTYLIS PARVINUX

0492000 -RHYNCHOSPORA VAHL
#. PRE HERBARIUM PRACTICE, FOLLOWING VAN LAREN & GORDON-GRAY.
180 R. CORYMBOSA (L.) BRITTON
(=R. spectabilis Hochst.) #
R. spectabilis Hochst. = R. CORYMBOSA

0515000 -SCLERIA BERG.
6. FRANKLIN HENNESSY. 1985. BOTHALIA 15: 505.
2800 S. POIFORMIS RETZ. (Note spelling change)

ARACEAE 684000

0694000 -ACORUS L.
1. UBBINK & BREOENKAMP. 1985. BOTHALIA 15: 547.

RESTIONACEAE 804000
This is a complete listing of Restionaceae, based on Linder (1985), and replaces that in the List of Species edn 2 part 1 (1985).

0804020 -STABEROHA KUNTH (Previous number 0814000)
1. PILLANS. 1928. TRANS. R. SOC. S. AFR. 16: 207.
2. PILLANS. 1941. TRANS. R. SOC. S. AFR. 29: 339.
3. PILLANS. 1952. JL S. AFR. BOT. 18: 101.
4. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 395.
100 S. AEMULA (KUNTH) PILLANS
200 S. BANKSII PILLANS
300 S. CERNUA (L. F.) OUR. & SCHINZ
400 S. OISTACHYOS (ROTTB.) KUNTH (Note spelling change)
500 S. MULTISPICULA PILLANS
600 S. OPNATA ESTERHUYSEN
700 S. REMOTA PILLANS
800 S. STOKOEI PILLANS
900 S. VAGINATA (THUNB.) PILLANS

0804030 -ISCHYROLEPIS STEUO. (=Restio p.p.)
1. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 397.
100 I. AFFINIS ESTERHUYSEN
200 I. ARIOA (PILLANS) LINDER
(=Restio aridus Pillans) 1
300 I. CAESPITOSA ESTERHUYSEN
400 I. CAPENSIS (L.) LINDER
(=Restio cuspidatus Thunb.) 1
500 I. CINCINNATA (MAST.) LINDER
(=Restio cincinnatus Mast.) 1
600 I. COACTILIS (MAST.) LINDER
(=Restio coactilis Mast.) 1
700 I. CURVIBRACTEATA ESTERHUYSEN
800 I. CURVIRAMIS (KUNTH) LINDER
(=Restio curviramis Kunth) 1
900 I. OISTRACTA (MAST) LINDER
(=Restio laniger Kunth var. distractus (Mast.) Pillans) 1
1000 I. OUTHIEAE (PILLANS) LINDER
(=Restio duthieae Pillans) 1
1100 I. ELEOCHARIS (MAST.) LINDER
(=Restio eleocharis Nees ex Mast.) 1
1200 I. ESTERHUYSENIAE (PILLANS) LINDER
(=Restio esterhuyseniae Pillans) 1
1300 I. FEMINEA ESTERHUYSEN
1400 I. FRATERNA (KUNTH) LINDER
(=Restio fraternus Kunth) 1
1500 I. FUSCIOULA (PILLANS) LINDER
(=Restio fuscidulus Pillans) 1
1600 I. GAUDICHAUDIANA (KUNTH) LINDER
(=Restio gaudichaudianus Kunth var. gaudichaudianus) 1
(=Restio gaudichaudianus Kunth var. luxurians Pillans) 1
1700 I. GOSSYPINA (MAST.) LINDER
(=Restio gossypinus Mast.) 1
1800 I. HELENAE (MAST.) LINDER
(=Restio helenae Mast.) 1
1900 I. HYSTRIX (MAST.) LINDER
(=Restio hystrix Mast.) 1
2000 I. KAPOOICA ESTERHUYSEN
2100 I. LANIGER (KUNTH) LINDER
(=Restio laniger Kunth var. laniger) 1
2200 I. LEPTOCLADOS (MAST.) LINDER
(=Restio leptoclados Mast.) 1
2300 I. LONGIARISTATA PILLANS EX LINDER
2400 I. MACER (KUNTH) LINDER
(=Restio macer Kunth) 1
2500 I. MARLOTHII (PILLANS) LINDER
(=Restio marlothii Pillans var. marlothii) 1
(=Restio marlothii Pillans var. parviflorus Pillans) 1
2600 I. MONANTHOS (MAST.) LINDER
(=Restio monanthos Mast.) 1
2700 I. NAMA ESTERHUYSEN
2800 I. NUBIGENA ESTERHUYSEN
2900 I. OCREATA (KUNTH) LINDER
(=Restio ocreatus Kunth) 1
3000 I. PALUDOSA (PILLANS) LINDER
(=Restio paludosus Pillans) 1

3100 I. PAPILLOSA ESTERHUYSEN
3200 I. PRATENSIS ESTERHUYSEN
3300 I. PYGMAEA (PILLANS) LINDER
(=Restio pygmaeus Pillans) 1
3400 I. RIVULA ESTERHUYSEN
3500 I. ROTTBOELLIOIDES (KUNTH) LINDER
(=Restio rottboellioides Kunth) 1
3600 I. SABULOSA (PILLANS) LINDER
(=Restio sabulosus Pillans) 1
3700 I. SCHOENOIDES (KUNTH) LINDER
(=Restio schoenoides Kunth) 1
(=Restio sieberi Kunth var. schoenoides (Kunth) Pillans) 1
3800 I. SETIGER (KUNTH) LINDER
(=Restio setiger Kunth) 1
3900 I. SIEBERI (KUNTH) LINDER
(=Restio sieberi Kunth var. sieberi) 1
(=Restio sieberi Kunth var. venustulus (Kunth) Pillans) 1
4000 I. SPORADICA ESTERHUYSEN
4100 I. SUBVERTICILLATA STEUD.
(=Restio subverticillatus (Steud.) Mast.) 1
4200 I. TENUISSIMA (KUNTH) LINDER
(=Restio tenuissimus Kunth) 1
(=Hypolaena tenuissima Pillans) 1
4300 I. TRIFLORA (ROTTB.) LINDER
(=Restio triflorus Rottb.) 1
4400 I. UNISPICATA LINDER
4500 I. VILIS (KUNTH) LINDER
(=Restio vilis Kunth) 1
4600 I. VIRGEA (MAST.) LINDER
(=Restio virgeus Mast.) 1
4700 I. WALLICHII (MAST.) LINDER
(=Restio wallichii Mast.) 1
4800 I. WITTEBERGENSIS ESTERHUYSEN

0804040 -ELEGIA L. (Previous number 0807000)
1. PILLANS. 1928. TRANS. R. SOC. S. AFR. 16: 207.
2. PILLANS. 1941. TRANS. R. SOC. S. AFR. 29: 339.
3. PILLANS. 1943. TRANS. R. SOC. S. AFR. 30: 245.
4. PILLANS. 1952. JL S. AFR. BOT. 18: 101.
5. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 418.
100 E. ALTIGENA PILLANS
E. amoena Pillans = E. RACEMOSA
200 E. ASPERIFLORA (NEES) KUNTH
(=E. glauca Mast.) 5
(=E. asperiflora (Nees) Kunth var. lacerata (Pillans) Pillans) 5
E. asperiflora (Nees) Kunth var. lacerata (Pillans) Pillans = E. ASPERIFLORA
300 E. ATRATIFLORA ESTERHUYSEN
E. bella Pillans = E. RACEMOSA
400 E. CAESPITOSA ESTERHUYSEN
500 E. CAPENSIS (BURM. F.) SCHELPE
600 E. COLEURA NEES EX MAST.
700 E. CUSPIDATA MAST.
800 E. EQUISETACEA (MAST.) MAST.
900 E. ESTERHUYSENIAE PILLANS
(=E. esterhuyseniae Pillans var. dispar Pillans) 5
E. esterhuyseniae Pillans var. dispar Pillans = E. ESTERHUYSENIAE
1000 E. EXTENSA PILLANS
1100 E. FASTIGIATA MAST.
1200 E. FENESTRATA PILLANS
1300 E. FILACEA MAST.
(=E. parviflora Pillans var. filacea (Mast.) Pillans) 5
(=E. parviflora Pillans var. parviflora) 5
1400 E. FISTULOSA KUNTH
(=E. fistulosa Kunth var. parviflora Pillans) 5
E. fistulosa Kunth var. parviflora Pillans = E. FISTULOSA
1500 E. FUCATA ESTERHUYSEN
1600 E. GALPINII N.E. BR.
E. glauca Mast. = E. ASPERIFLORA
1700 E. GRANDIS (NEES) KUNTH
1800 E. GRANDISPICATA LINDER
1900 E. HUTCHINSONII PILLANS
2000 E. INTERMEDIA (STEUD.) PILLANS
2100 E. JUNCEA L.
(=E. juncea L. var. geniculata Pillans) 5
E. juncea L. var. geniculata Pillans = E. JUNCEA
2200 E. MUIRII PILLANS
2300 E. NEESII MAST.
E. parviflora Pillans var. filacea (Mast.) Pillans = E. FILACEA
E. parviflora Pillans var. parviflora = E. FILACEA
E. parviflora Pillans var. rigida (Mast.) Pillans = E. RIGIDA
2400 E. PERSISTENS MAST.
2500 E. PROMINENS PILLANS
2600 E. RACEMOSA (POIR.) PERS.
(=E. amoena Pillans) 5
(=E. bella Pillans) 5
2700 E. RIGIDA MAST.
(=E. parviflora Pillans var. rigida (Mast.) Pillans) 5
(=E. spathacea Mast. var. attenuata Pillans) 5
2800 E. SPATHACEA MAST.
E. spathacea Mast. var. attenuata Pillans = E. RIGIDA
2900 E. SQUAMOSA MAST.
3000 E. STIPULARIS MAST.
3100 E. STOKOEI PILLANS
3200 E. THYRSIFERA (ROTTB.) PERS.
3300 E. THYRSOIDEA (MAST.) PILLANS
3400 E. VAGINULATA MAST.
3500 E. VERREAUXII MAST.

0804050 -CHONDROPETALUM ROTTB. (Previous number 0805000)
1. PILLANS. 1928. TRANS. R. SOC. S. AFR. 16: 207.
2. PILLANS. 1941. TRANS. R. SOC. S. AFR. 29: 339.
3. PILLANS. 1943. TRANS. R. SOC. S. AFR. 30: 245.
4. PILLANS. 1952. JL S. AFR. BOT. 18: 101.
5. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 427.
100 C. ACOCKII PILLANS
200 C. AGGREGATUM (MAST.) PILLANS
C. albo-aristatum Pillans = ASKIDIOSPERMA ALBO-ARISTATUM
C. andreaeanum Pillans = ASKIDIOSPERMA ANDREAEANUM
C. capitatum (Steud.) Pillans = ASKIDIOSPERMA CAPITATUM
C. chartaceum (Pillans) Pillans = ASKIDIOSPERMA CHARTACEUM SUBSP. CHARTACEUM
300 C. DECIPIENS ESTERHUYSEN
400 C. DEUSTUM ROTTB. (Note author change)
500 C. EBRACTEATUM (KUNTH) PILLANS
C. esterhuyseniae Pillans = ASKIDIOSPERMA ESTERHUYSENIAE
600 C. HOOKERIANUM (MAST.) PILLANS
C. insigne Pillans = ASKIDIOSPERMA INSIGNE
C. longiflorum Pillans = ASKIDIOSPERMA LONGIFLORUM
C. macrocarpum (Kunth) Pillans = DOVEA MACROCARPA
700 C. MARLOTHII (PILLANS) PILLANS
800 C. MICROCARPUM (KUNTH) PILLANS
900 C. MUCRONATUM (NEES) PILLANS
C. nitidum (Mast.) Pillans = ASKIDIOSPERMA NITIDUM
1000 C. NUDUM ROTTB. (Note author change)
C. paniculatum (Mast.) Pillans = ASKIDIOSPERMA PANICULATUM
1100 C. RECTUM (MAST.) PILLANS
1200 C. TECTORUM (L. F.) RAF. (Note author change)

0804060 -DOVEA KUNTH (=Chondropetalum p.p.)
1. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 431.
100 D. MACROCARPA KUNTH
(=Chondropetalum macrocarpum (Kunth) Pillans) 1

0804070 -ASKIDIOSPERMA STEUD. (=Chondropetalum p.p.)
1. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 431.
100 A. ALBO-ARISTATUM (PILLANS) LINDER
(=Chondropetalum albo-aristatum Pillans) 1
200 A. ANDREAEANUM (PILLANS) LINDER
(=Chondropetalum andreaeanum Pillans) 1
300 A. CAPITATUM STEUD.
(=Chondropetalum capitatum (Steud.) Pillans) 1
400 A. CHARTACEUM (PILLANS) LINDER SUBSP. ALTICOLUM ESTERHUYSEN
500 A. CHARTACEUM (PILLANS) LINDER SUBSP. CHARTACEUM
(=Chondropetalum chartaceum (Pillans) Pillans) 1
600 A. ESTERHUYSENIAE (PILLANS) LINDER
(=Chondropetalum esterhuyseniae Pillans) 1
700 A. INSIGNE (PILLANS) LINDER
(=Chondropetalum insigne Pillans) 1
800 A. LONGIFLORUM (PILLANS) LINDER
(=Chondropetalum longiflorum Pillans) 1
900 A. NITIDUM (MAST.) LINDER
(=Chondropetalum nitidum (Mast.) Pillans) 1
1000 A. PANICULATUM (MAST.) LINDER
(=Chondropetalum paniculatum (Mast.) Pillans) 1
1100 A. RUGOSUM ESTERHUYSEN

0804080 -PLATYCAULOS LINDER (Previous number 0804010)
1. LINDER. 1984. BOTHALIA 15:1.
2. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 434.
100 P. ACUTUS ESTERHUYSEN
200 P. ANCEPS (MAST.) LINDER
(=Restio anceps (Mast.) Pillans) 2
300 P. CALLISTACHYUS (KUNTH) LINDER
(=Restio callistachyus Kunth) 2
400 P. CASCADENSIS (PILLANS) LINDER
(=Restio cascadensis Pillans) 2
500 P. COMPRESSUS (ROTTB.) LINDER
(=Restio compressus Rottb.) 2
600 P. DEPAUPERATUS (KUNTH) LINDER
(=Restio depauperatus Kunth) 2
700 P. MAJOR (MAST.) LINDER
(=Restio major (Mast.) Pillans) 2
800 P. SUBCOMPRESSUS (PILLANS) LINDER
(=Restio subcompressus Pillans) 2

0804090 -RESTIO ROTTB. (Previous number 0804000)
1. PILLANS. 1928. TRANS. R. SOC. S. AFR. 16: 207.
2. PILLANS. 1941. TRANS. R. SOC. S. AFR. 29: 339.

3. PILLANS. 1943. TRANS. R. SOC. S. AFR. 30: 245.
4. PILLANS. 1952. JL S. AFR. BOT. 18: 101.
5. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 437.

100 R. ACOCKII PILLANS
200 R. ALTICOLA PILLANS (Note spelling change)
300 R. AMBIGUUS MAST.
R. anceps (Mast.) Pillans = PLATYCAULOS ANCEPS
400 R. ARCUATUS MAST.
R. aridus Pillans = ISCHYROLEPIS ARIDA
500 R. AUREOLUS PILLANS
600 R. BIFARIUS MAST.
700 R. BIFIOUS THUNB.
800 R. BIFURCUS NEES EX MAST.
900 R. BOLUSII PILLANS
1000 R. BRACHIATUS (MAST.) PILLANS
1100 R. BRUNNEUS PILLANS
1200 R. BURCHELLII PILLANS
R. callistachyus Kunth = PLATYCAULOS CALLISTACHYUS
1300 R. CAPILLARIS KUNTH
R. cascadensis Pillans = PLATYCAULOS CASCAOENSIS
R. cincinnatus Mast. = ISCHYROLEPIS CINCINNATA
R. coactilis Mast. = ISCHYROLEPIS COACTILIS
1400 R. COLLICULOSPERMUS LINDER
1500 R. COMMUNIS PILLANS
R. compressus Rottb. = PLATYCAULOS COMPRESSUS
1600 R. CONFUSUS PILLANS
1700 R. CORNEOLUS ESTERHUYSEN
R. curviramis Kunth = ISCHYROLEPIS CURVIRAMIS
R. cuspidatus Thunb. = ISCHYROLEPIS CAPENSIS
1800 R. CYMOSUS (MAST.) PILLANS
1900 R. DEBILIS NEES
(=R. debilis Nees var. subulatus (Mast.) Pillans) 5
R. debilis Nees var. subulatus (Mast.) Pillans = R. DEBILIS
1950 R. DECIPIENS (N.E. BR.) LINDER
(=Hypolaena decipiens N.E. Br.) 5
2000 R. DEGENERANS PILLANS
(=Leptocarpus intermedius Pillans) 5
R. depauperatus Kunth = PLATYCAULOS DEPAUPERATUS
2100 R. DISPAR MAST.
2200 R. DISTANS PILLANS
2300 R. DISTICHUS ROTTB.
(=Leptocarpus distichus (Rottb.) Pillans) 5
2400 R. DODII PILLANS
(=R. dodii Pillans var. purpureus Pillans) 5
R. dodii Pillans var. purpureus Pillans = R. DODII
R. duthieae Pillans = ISCHYROLEPIS DUTHIEAE
2500 R. ECHINATUS KUNTH
2600 R. EGREGIUS HOCHST.
2700 R. EJUNCIDUS MAST.
(=Leptocarpus ejuncidus (Mast.) Pillans) 5
R. eleocharis Nees ex Mast. = ISCHYROLEPIS ELEOCHARIS
R. esterhuyseniae Pillans = ISCHYROLEPIS ESTERHUYSENIAE
2800 R. EXILIS MAST.
2900 R. FESTUCIFORMIS NEES EX MAST. (Note spelling change)
(=Leptocarpus parkeri Pillans) 5
3000 R. FILICAULIS PILLANS
3100 R. FILIFORMIS POIR.
R. foliosus N.E. Br. = RHODOCOMA GIGANTEA
3200 R. FOURCADEI PILLANS
3300 R. FRAGILIS ESTERHUYSEN
R. fraternus Kunth = ISCHYROLEPIS FRATERNA
R. fruticosus Thunb. = PHODOCOMA FRUTICOSA
R. fuscidulus Pillans = ISCHYROLEPIS FUSCIOULA
3400 R. FUSIFORMIS PILLANS
3500 R. GALPINII PILLANS
R. gaudichaudianus Kunth var. gaudichaudianus = ISCHYROLEPIS GAUDICHAUOIANA
R. gaudichaudianus Kunth var. luxurians Pillans = ISCHYROLEPIS GAUOICHAUDIANA
R. giganteus (Kunth) N.E. Br. = RHODOCOMA GIGANTEA
R. gossypinus Mast. = ISCHYROLEPIS GOSSYPINA
3600 R. HARVEYI MAST.
R. helenae Mast. = ISCHYROLEPIS HELENAE
R. hystrix Mast. = ISCHYROLEPIS HYSTRIX
3700 R. IMPLICATUS ESTERHUYSEN
3800 R. INCONSPICUUS ESTERHUYSEN
3900 R. INGENS ESTERHUYSEN
4000 R. INSIGNIS PILLANS
4100 R. INVETERATUS ESTERHUYSEN
4200 R. INVOLUTUS PILLANS
R. laniger Kunth var. distractus (Mast.) Pillans = ISCHYROLEPIS DISTPACTA
R. laniger Kunth var. laniger = ISCHYROLEPIS LANIGER
R. leptoclados Mast. = ISCHYROLEPIS LEPTOCLADOS
4300 R. LEPTOSTACHYUS KUNTH
(=R. pusillus Pillans) 5
R. macer Kunth = ISCHYROLEPIS MACER
R. major (Mast.) Pillans = PLATYCAULOS MAJOR
R. marlothii Pillans var. marlothii = ISCHYROLEPIS MARLOTHII
R. marlothii Pillans var. parviflorus Pillans = ISCHYROLEPIS MARLOTHII
4500 R. MICANS (KUNTH) NEES
4600 R. MISER KUNTH
R. monanthos Mast. = ISCHYROLEPIS MONANTHOS
4700 R. MONTANUS ESTERHUYSEN
4800 R. MULTIFLORUS SPRENG.
4900 R. NOODSUS PILLANS
5000 R. NUWEBERGENSIS ESTERHUYSEN
R. oblongus Mast. = ANTHOCHORTUS CRINALIS
5100 R. OBSCURUS PILLANS
R. obtusissimus Steud. = NEVILLEA OBTUSISSIMA
5200 R. OCCULTUS (MAST.) PILLANS
R. ocreatus Kunth. = ISCHYROLEPIS OCREATA
5300 R. PACHYSTACHYUS KUNTH
R. paludosus Pillans = ISCHYROLEPIS PALUDOSA
5400 R. PAPYRACEUS PILLANS
5500 R. PATENS MAST.
5600 R. PECULIARIS ESTERHUYSEN
5700 R. PEDICELLATUS MAST.
(=R. sonderianus Mast.) 5
5800 R. PERPLEXUS KUNTH
5900 R. PERSEVERANS ESTERHUYSEN
6000 R. PILLANSII LINDER
(=Leptocarpus stokoei Pillans) 5
6100 R. PRAEACUTUS MAST.
6200 R. PULVINATUS ESTERHUYSEN
6300 R. PUMILIS ESTERHUYSEN
6400 R. PURPURASCENS NEES EX MAST.
R. pusillus Pillans = R. LEPTOSTACHYUS
R. pygmaeus Pillans = ISCHYROLEPIS PYGMAEA
6500 R. QUADRATUS MAST.
6600 R. QUINQUEFARIUS NEES
6700 R. RAPUS ESTERHUYSEN
R. rhodocoma Mast. = RHODOCOMA CAPENSIS
R. rottboellioides Kunth = ISCHYROLEPIS ROTTBOELLIOIDES
6800 R. RUPICOLA ESTERHUYSEN
R. scoulosus Pillans = ISCHYROLEPIS SABULOSA
6900 R. SAROCLADUS MAST. (Note spelling change)
7000 R. SCABER MAST.
7100 R. SCABERULUS N.E. BR.
R. schoenoides Kunth = ISCHYROLEPIS SCHOENOIDES
7200 R. SECUNOUS (PILLANS) LINDER
(=Leptocarpus secundus Pillans) 5
7300 R. SEJUNCTUS MAST.
R. setiger Kunth = ISCHYROLEPIS SETIGER
R. sieberi Kunth var. schoenoides (Kunth) Pillans = ISCHYROLEPIS SCHOENOIDES
R. sieberi Kunth var. sieberi = ISCHYROLEPIS SIEBERI
R. sieberi Kunth var. venustulus (Kunth) Pillans = ISCHYROLEPIS SIEBERI
7400 R. SIMILIS PILLANS
7500 R. SINGULARIS ESTERHUYSEN
R. sonderianus Mast. = R. PEDICELLATUS
7600 R. STEREOCAULIS MAST.
7700 R. STOKOEI PILLANS
7800 R. STRICTUS N.E. BR.
7900 R. STROBOLIFER KUNTH
R. subcompressus Pillans = PLATYCAULOS SUBCOMPRESSUS
8000 R. SUBTILIS NEES EX MAST.
R. subverticillatus (Steud.) Mast. = ISCHYROLEPIS SUBVERTICILLATA
R. tenuissimus Kunth = ISCHYROLEPIS TENUISSIMA
8100 R. TETRAGONUS THUNB.
R. triflorus Rottb. = ISCHYROLEPIS TRIFLORA
8200 R. TRITICEUS ROTTB.
8300 R. TUBERCULATUS PILLANS
8400 R. VALLIS-SIMIUS LINDER
8500 R. VERRUCOSUS ESTERHUYSEN
8600 R. VERSATILIS LINDER
(=Hypolaena diffusa Mast.) 5
R. vilis Kunth = ISCHYROLEPIS VILIS
R. virgeus Mast. = ISCHYROLEPIS VIRGEA
R. wallichii Mast. = ISCHYROLEPIS WALLICHII
8700 R. ZULUENSIS LINDER
8800 R. ZWARTBERGENSE PILLANS

0804100 -CALOPSIS BEAUV. EX. DESV. (=Leptocarpus p.p)
1. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 464.
100 C. ADPRESSA ESTERHUYSEN
200 C. ANDREAEANA (PILLANS) LINDER
(=Leptocarpus andreaeanus Pillans) 1
300 C. ASPERA (MAST.) LINDER
(=Leptocarpus asper (Mast.) Pillans) 1
400 C. BURCHELLII (MAST.) LINDER
(=Leptocarpus burchellii Mast.) 1
500 C. CLANDESTINA ESTERHUYSEN
600 C. DURA ESTERHUYSEN
700 C. ESTERHUYSENIAE (PILLANS) LINDER
(=Leptocarpus esterhuyseniae Pillans) 1
800 C. FILIFORMIS (MAST.) LINDER
(=Hypolaena filiformis Mast.) 1
900 C. FRUTICOSA (MAST.) LINDER
(=Leptocarpus fruticosus Mast.) 1
1000 C. GRACILIS (MAST.) LINDER
(=Leptocarpus gracilis (Mast.) Pillans) 1
(=Leptocarpus ramosissimus Pillans) 1
1100 C. HYALINA (MAST.) LINDER
(=Leptocarpus hyalinus (Mast.) Pillans) 1
(=Mastersiella hyalina (Mast.) Gilg-Ben.) 1
1200 C. IMPOLITA (KUNTH) LINDER
(=Leptocarpus impolitus (Kunth) Pillans) 1
1300 C. LEVYNSIAE (PILLANS) LINDER
(=Leptocarpus levynsiae Pillans) 1
1400 C. MARLOTHII (PILLANS) LINDER
(=Leptocarpus marlothii Pillans) 1
1500 C. MEMBRANACEA (PILLANS) LINDER
(=Leptocarpus membranaceus Pillans) 1

1600 C. MONOSTYLIS (PILLANS) LINDER
(=Leptocarpus monostylis Pillans) 1
1700 C. MUIRII (PILLANS) LINDER
(=Leptocarpus muirii Pillans) 1
1800 C. NUDIFLORA (PILLANS) LINDER
(=Leptocarpus nudiflorus Pillans)
1900 C. PANICULATA (ROTTB.) DESV.
(=Leptocarpus paniculatus (Rottb.) Mast.)
2000 C. PULCHRA ESTERHUYSEN
2100 C. RIGIDA (MAST.) LINDER
(=Leptocarpus rigidus Mast.)
2200 C. RIGORATA (MAST.) LINDER
(=Leptocarpus rigoratus Mast. var. rigoratus)
(=Leptocarpus rigoratus Mast. var. simulans Pillans)
2400 C. VIMINEA (ROTTB.) LINDER
(=Leptocarpus vimineus (Rottb.) Pillans var. hirtellus (Kunth) Pillans) 1
(=Leptocarpus vimineus (Pottb.) Pillans var. vimineus) 1

0804105 -Leptocarpus = CALOPSIS, HYDROPHILUS, RESTIO
L. andreaeanus Pillans = CALOPSIS ANDREAEANA
L. asper (Mast.) Pillans = CALOPSIS ASPERA
L. burchellii Mast. = CALOPSIS BURCHELLII
L. distichus (Rottb.) Pillans = RESTIO DISTICHUS
L. ejuncidus (Mast.) Pillans = RESTIO EJUNCIDUS
L. esterhuyseniae Pillans = CALOPSIS ESTERHUYSENIAE
L. fruticosus Mast. = CALOPSIS FRUTICOSA
L. gracilis (Mast.) Pillans = CALOPSIS GRACILIS
L. hyalinus (Mast.) Pillans = CALOPSIS HYALINA
L. impolitus (Kunth) Pillans = CALOPSIS IMPOLITA
L. intermedius Pillans = RESTIO DEGENERANS
L. levynsiae Pillans = CALOPSIS LEVYNSIAE
L. marlothii Pillans = CALOPSIS MARLOTHII
L. membranaceus Pillans = CALOPSIS MEMBRANACEA
L. monostylis Pillans = CALOPSIS MONOSTYLIS
L. muirii Pillans = CALOPSIS MUIRII
L. nudiflorus Pillans = CALOPSIS NUDIFLORA
L. paniculatus (Rottb.) Mast. = CALOPSIS PANICULATA
L. parkeri Pillans = RESTIO FESTUCIFORMIS
L. ramosissimus Pillans = CALOPSIS GRACILIS
L. rattrayi Pillans = HYDROPHILUS RATTRAYI
L. rigidus Mast. = CALOPSIS RIGIDA
L. rigoratus Mast. var. rigoratus = CALOPSIS RIGORATA
L. rigoratus Mast. var. simulans Pillans = CALOPSIS RIGORATA
L. secundus Pillans = RESTIO SECUNDUS
L. stokoei Pillans = RESTIO PILLANSII
L. vimineus (Rottb.) Pillans var. hirtellus (Kunth) Pillans = CALOPSIS VIMINEA
L. vimineus (Rottb.) Pillans var. vimineus = CALOPSIS VIMINEA

0804110 -THAMNOCHORTUS BERG. (Previous number 0813000)
1. PILLANS. 1928. TRANS. R. SOC. S. AFR. 16: 207.
2. PILLANS. 1941. TRANS. R. SOC. S. AFR. 29: 339.
3. PILLANS. 1943. TRANS. R. SOC. S. AFR. 30: 245.
4. PILLANS. 1952. JL S. AFR. BOT. 18: 101.
5. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 471.
100 T. ACUMINATUS PILLANS
200 T. APENARIUS ESTERHUYSEN
T. argenteus Kunth = T. CINEREUS
300 T. BACHMANNII MAST.
400 T. CINEREUS LINDER
(=T. argenteus Kunth) 5
T. comptonii Pillans = T. PLATYPTERIS
T. dichotomus Mast. var. dichotomus = T. LUCENS
T. dichotomus Mast. var. hyalinus Pillans = T. LUCENS
500 T. DUMOSUS MAST.
600 T. ELLIPTICUS PILLANS
700 T. ERECTUS (THUNB.) MAST.
800 T. FRATERNUS PILLANS
900 T. FRUTICOSUS BERG.
1000 T. GLABER PILLANS
1100 T. GRACILIS (DUR. & SCHINZ) MAST.
1200 T. GUTHRIEAE PILLANS
(=T. lewisiae Pillans) 5
(=T. nervosus Pillans) 5
(=T. plumosus Pillans) 5
1300 T. INSIGNIS MAST.
1400 T. LEVYNSIAE PILLANS
T. lewisiae Pillans = T. GUTHRIEAE
1500 T. LUCENS (POIR.) LINDER
(=T. dichotomus Mast. var. dichotomus) 5
(=T. dichotomus Mast. var. hyalinus Pillans) 5
(=T. papillosus Pillans) 5
1600 T. MUIRII PILLANS
T. muticus Pillans = T. SPORADICUS
T. nervosus Pillans = T. GUTHRIEAE
1700 T. NUTANS (THUNB.) PILLANS
1800 T. OBTUSUS PILLANS
1900 T. PANICULATUS MAST.
T. papillosus Pillans = T. LUCENS
2000 T. PAPYRACEUS PILLANS
2100 T. PELLUCIDUS PILLANS
T. piketbergensis Pillans = T. SPORADICUS
2200 T. PLATYPTERIS KUNTH
(=T. comptonii Pillans) 5
T. plumosus Pillans = T. GUTHRIEAE
2300 T. PLUPISTACHYUS MAST.
2400 T. PULCHER PILLANS
2500 T. PUNCTATUS PILLANS
2600 T. RIGIDUS ESTERHUYSEN
2700 T. SCABRIDUS PILLANS
2800 T. SCHLECHTERI PILLANS
T. similis Pillans = T. SPORADICUS
2900 T. SPICIGERUS (THUNB.) R. BR.
3000 T. SPORADICUS PILLANS
(=T. muticus Pillans) 5
(=T. piketbergensis Pillans) 5
(=T. similis Pillans) 5
3100 T. STOKOEI PILLANS

0804120 -RHODOCOMA NEES (=Pestio p.p.)
1. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 478.
100 R. CAPENSIS NEES EX STEUD.
(=Restio rhodocoma Mast.) 1
200 R. FRUTICOSA (THUNB.) LINDER
(=Restio fruticosus Thunb.) 1
300 R. GIGANTEA (KUNTH) LINDER
(=Pestio foliosus N.E. Br.) 1
(=Restio giganteus (Kunth) N.E. Br.) 1

0804130 -CERATOCARYUM NEES (=Willdenowia p.p.)
1. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 479.
100 C. ARGENTEUM NEES EX KUNTH
(=Willdenowia argentea (Kunth) Hieron.) 1
200 C. DECIPIENS (N.E.BR.) LINDER
(=Willdenowia decipiens N.E. Br.) 1
300 C. FIMBRIATUM (KUNTH) LINDER
(=Willdenowia esterhuyseniae Pillans) 1
(=Willdenowia fimbriata Kunth) 1
400 C. FISTULOSUM MAST.
(=Willdenowia fistulosa (Mast.) Pillans) 1
500 C. XEROPHILUM (PILLANS) LINDER
(=Willdenowia xerophila Pillans) 1

0804140 -CANNOMOIS DESV. (Previous number 0817000)
1. PILLANS. 1928. TRANS. R. SOC. S. AFR. 16: 207.
2. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 480.
C. acuminata (Kunth) Pillans = C. PARVIFLORA
100 C. ARISTATA MAST.
200 C. CONGESTA MAST.
(=C. scirpoides Mast. var. minor Pillans) 2
(=C. scirpoides Mast. var. primosii Pillans) 2
C. dregei Pillans = C. SCIRPOIDES
300 C. NITIDA (MAST.) PILLANS
400 C. PARVIFLORA (THUNB.) PILLANS
(=C. acuminata (Kunth) Pillans) 2
500 C. SCIRPOIDES MAST.
(=C. dregei Pillans) 2
C. scirpoides Mast. var. minor Pillans = C. CONGESTA
C. scirpoides Mast. var. primosii Pillans = C. CONGESTA
600 C. VIRGATA (ROTTB.) STEUD.

0804150 -NEVILLEA ESTERHUYSEN & LINDER (Previous number 0817010)
1. LINDER. 1984. BOTHALIA 15: 1.
2. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 482.
100 N. OBTUSISSIMA (STEUD.) LINDER
(=Restio obtusissimus Steud.) 2
200 N. SINGULARIS ESTERHUYSEN

0804160 -HYDROPHILUS LINDER (Previous number 0817020)
1. LINDER. 1984. BOTHALIA 15: 1.
2. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 484.
100 H. RATTRAYI (PILLANS) LINDER
(=Leptocarpus rattrayi Pillans) 2

0804170 -ANTHOCHORTUS NEES (Previous number 0818010)
1. LINDER. 1984. BOTHALIA 15: 1.
2. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 484.
100 A. CAPENSIS ESTERHUYSEN
200 A. CRINALIS (MAST.) LINDER
(=Hypolaena crinalis (Mast.) Pillans) 2
(=Restio oblongus Mast.) 2
300 A. ECKLONII NEES
400 A. GRAMINIFOLIUS (KUNTH) LINDER
(=Hypolaena graminifolia (Kunth) Pillans) 2
(=Mastersiella foliosa (Mast.) Gilg-Ben.) 2
500 A. INSIGNIS (MAST.) LINDER
(=Phyllocomos insignis Mast.) 2
600 A. LAXIFLORUS (NEES) LINDER
(=Hypolaena laxiflora Nees) 2
(=Hypolaena stokoei Pillans) 2
(=Mastersiella laxiflora (Nees) Gilg-Ben.) 2

0804180 -MASTERSIELLA GILG-BEN.
1. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 487.
100 M. DIGITATA (THUNB.) GILG-BEN.
(=Hypolaena digitata (Thunb.) Pillans) 1
M. foliosa (Mast.) Gilg-Ben. = ANTHOCHORTUS GRAMINIFOLIUS
M. hyalina (Mast.) Gilg-Ben. = CALOPSIS

HYALINA
M. laxiflora (Nees) Gilg-Ben. = ANTHOCHORTUS LAXIFLORUS
200 M. PURPUREA (PILLANS) LINDER (=Hypolaena purpurea Pillans) 1
300 M. SPATHULATA (PILLANS) LINDER (=Hypolaena spathulata Pillans) 1

0804182 -Hypolaena = ANTHOCHORTUS, CALOPSIS, ISCHYROLEPIS, MASTERSIELLA, RESTIO
H. crinalis (Mast.) Pillans = ANTHOCHORTUS CRINALIS
H. decipiens N.E. Br. = RESTIO DECIPIENS
H. diffusa Mast. = RESTIO VERSATILIS
H. digitata (Thunb.) Pillans = MASTERSIELLA DIGITATA
H. filiformis Mast. = CALOPSIS FILIFORMIS
H. graminifolia (Kunth) Pillans = ANTHOCHORTUS GRAMINIFOLIUS
H. laxiflora Nees = ANTHOCHORTUS LAXIFLORUS
H. purpurea Pillans = MASTERSIELLA PURPUREA
H. spathulata Pillans = MASTERSIELLA SPATHULATA
H. stokoei Pillans = ANTHOCHORTUS LAXIFLORUS
H. tenuissima Pillans = ISCHYROLEPIS TENUISSIMA

0804185 -Phyllocomos = ANTHOCHORTUS
P. insignis Mast. = ANTHOCHORTUS INSIGNIS

0804190 -HYPODISCUS NEES (Previous number 0816000)
1. PILLANS. 1928. TRANS. R. SOC. S. AFR. 16: 207.
2. PILLANS. 1941. TRANS. R. SOC. S. AFR. 29: 339.
3. PILLANS. 1952. JL S. AFR. BOT. 18: 101.
4. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 488.
100 H. ALBO-ARISTATUS (NEES) MAST. (=H. albo-aristatus (Nees) Mast. var. olivieranus Pillans) 4
H. albo-aristatus (Nees) Mast. var. olivieranus Pillans = H. ALBO-ARISTATUS
200 H. ALTERNANS PILLANS
300 H. ARGENTEUS (THUNB.) MAST.
400 H. ARISTATUS (THUNB.) NEES (=H. aristatus (Thunb.) Nees var. protractus (Mast.) Pillans) 4
H. aristatus (Thunb.) Nees var. protractus (Mast.) Pillans = H. ARISTATUS
H. binatus (Steud.) Mast. = H. LAEVIGATUS
500 H. LAEVIGATUS (KUNTH) LINDER (=H. binatus (Steud.) Mast.) 4
600 H. MONTANUS ESTERHUYSEN
700 H. NEESII MAST.
H. paludosus Pillans = H. RUGOSUS
H. parkeri Pillans = H. RUGOSUS
800 H. PROCURRENS ESTERHUYSEN
900 H. RIGIDUS MAST.
1000 H. RUGOSUS MAST. (=H. paludosus Pillans) 4 (=H. parkeri Pillans) 4
1100 H. SQUAMOSUS ESTERHUYSEN
1200 H. STRIATUS (KUNTH) MAST.
1300 H. SULCATUS PILLANS
1400 H. SYNCHROOLEPIS (STEUD.) MAST.
1500 H. WILLDENOWIA (NEES) MAST.

0804200 -WILLDENOWIA THUNB. (Previous number 0818000) 4
1. PILLANS. 1928. TRANS. R. SOC. S. AFR. 16: 207.
2. PILLANS. 1941. TRANS. R. SOC. S. AFR. 29: 339.
3. PILLANS. 1943. TRANS. R. SOC. S. AFR. 30: 245.
4. PILLANS. 1952. JL S. AFR. BOT. 18: 101.
5. LINDER. 1985. CONSPECTUS. BOTHALIA 15: 493.
100 W. AFFINIS PILLANS
200 W. ARESCENS KUNTH
W. argentea (Kunth) Hieron. = CERATOCARYUM ARGENTEUM
300 W. BOLUSII PILLANS
W. decipiens N.E. Br. = CERATOCARYUM DECIPIENS
W. esterhuyseniae Pillans = CERATOCARYUM FIMBRIATUM
W. fimbriata Kunth = CERATOCARYUM FIMBRIATUM
W. fistulosa (Mast.) Pillans = CERATOCARYUM FISTULOSUM
400 W. GLOMERATA (THUNB.) LINDER (=W. lucaeana Kunth) 5
500 W. HUMILIS MAST.
600 W. INCURVATA (THUNB.) LINDER (=W. striata Thunb.) 5
W. lucaeana Kunth = W. GLOMERATA
700 W. PURPUREA PILLANS
800 W. RUGOSA ESTERHUYSEN
900 W. STOKOEI PILLANS
W. striata Thunb. = W. INCURVATA
1000 W. SULCATA MAST.
1100 W. TEPES THUNB.
W. xerophila Pillans = CERATOCARYUM XEROPHILUM

XYRIDACEAE 826000

0826000 -XYRIS L.
2. LEWIS & OBERMEYER. 1985. FSA 4,2: 1.

ERIOCAULACEAE 828000

0828000 -ERIOCAULON L.
3. OBERMEYER. 1985. FSA 4,2: 9.
0832010 -SYNGONANTHUS RUHL.
3. OBERMEYER. 1985. FSA 4,2: 19.

COMMELINACEAE 893000

0896000 -COMMELINA L.
4. OBERMEYER. 1985. FSA 4,2: 24.
1000 C. FORSKAOLII VAHL (Note spelling change)
1050 C. IMBEPBIS HASSK. (=C. kotschyi Hassk.) 4
C. kotschyi Hassk. = C. IMBEPBIS

0899000 -ANEILEMA R. BR.
3. FADEN. 1985. FSA 4,2: 36.
100 A. AEQUINOCTIALE (BEAUV.) LOUDON (Note author change)
500 A. ZEBRINUM CHIOV. (=Ballya zebrina (Chiov.) Brenan) 3

0899010 -MURDANNIA ROYLE
3. OBERMEYER. 1985. FSA 4,2: 47.

0899020 -Ballya Brenan Species moved to ANEILEMA.
B. zebrina (Chiov.) Brenan = ANEILEMA ZEBRINUM

0903000 -COLEOTPYPE C.B. CL.
2. OBERMEYER. 1985. FSA 4,2: 49.

0904000 -CYANOTIS D. DON
3. OBERMEYER. 1985. FSA 4,2: 50.

0908000 -FLOSCOPA LOUR.
3. OBERMEYER. 1985. FSA 4,2: 56.

0911000 -TRADESCANTIA L.
1. OBERMEYER. 1985. FSA 4,2: 59.

PONTEDERIACEAE 920000

0920000 -MONOCHORIA PRESL
2. OBERMEYER. 1985. FSA 4,2: 61.
100 M. AFRICANA (SOLMS-LAUB.) N.E. BR. (Note author change)

0921000 -EICHHORNIA KUNTH
3. OBERMEYER. 1985. FSA 4,2: 63.

0922000 -PONTEDERIA L.
1. OBERMEYER. 1985. FSA 4,2: 66.

0924000 -HETERANTHERA RUIZ & PAV.
2. OBERMEYER. 1985. FSA 4,2: 68.

JUNCACEAE 930000

0930000 -PRIONIUM E. MEY.
3. OBERMEYER. 1985. FSA 4,2: 71.

0936000 -JUNCUS L.
3. OBERMEYER. 1985. FSA 4,2: 73.
720 J. CAPENSIS X LOMATOPHYLLUS 3
1450 J. IMBRICATUS LA HARPE *

0937000 -LUZULA DC.
2. OBERMEYER. 1985. FSA 4,2: 91.

LILIACEAE 942000

0972000 -WURMBEA THUNB. Revision: B. Nordenstam (S).
3. NORDENSTAM. 1978. NOTES R. BOT. GDN EDINB. 36:211.
1480 W. TENUIS (HOOK. F.) BAK. SUBSP. AUSTRALIS B. NORD. 3

0984000 -BULBINELLA KUNTH
##. PRE HERBARIUM PRACTICE, FOLLOWING P.L. PERRY.
350 B. PUNCTULATA A. ZAHLBR. ##

0985000 -BULBINE WILLD.
4. HALL. 1984. S. AFR. J. BOT. 3: 356.
1950 B. LOUWII L.I. HALL 4
1980 B. MARGARETHAE L.I. HALL 4
3350 B. WIESEI L.I. HALL 4

0989000 -ANTHERICUM L.
1000 A. GALPINII BAK. VAR. NORLINDHII (WEIM.) OBERM. (Note spelling change)

1026000 -ALOE L. Revision: H.F. Glen & D.S. Hardy (PRE).
3. VAN JAARSVELD. 1985. S. AFR. J. BOT. 51: 287.
4. HILLIARD & BURTT. 1985. NOTES ROY. BOT. GARD. EDINB. 42: 227.
#. PRE HERBARIUM PRACTICE, FOLLOWING GLEN & HARDY.
A. boylei Bak. subsp. major Hilliard & Burtt = A. ECKLONIS
1700 A. BREVIFOLIA MILL. (=A. brevifolia Mill. var. depressa (Haw.) Bak. #
(=A. brevifolia Mill. var. postgenita (Roem. & Schult.) Bak.) #
A. brevifolia Mill. var. depressa (Haw.) Bak. = A. BREVIFOLIA
A. brevifolia Mill. var. postgenita (Roem. & Schult.) Bak.) = A. BREVIFOLIA
A. chortolirioides Berger var. boastii (Letty) Reynolds = A. CHORTOLIRIOIDES VAR CHORTOLIPIOIDES
3000 A. CHORTOLIRIOIDES BERGER VAR CHORTOLIPIOIDES (=A. chortolirioides Berger var. boastii (Letty) Reynolds) #

4900 A. ECKLONIS SALM-DYCK
(=A. boylei Bak. subsp. major Hilliard & Burtt 4) #
A. gracilis Haw. var. decumbens Reynolds = A. GRACILIS
6400 A. GRACILIS HAW.
(=A. gracilis Haw. var. decumbens Reynolds) #
A. humilis (L.) Mill. var. acuminata (Haw.) Bak. = A. HUMILIS
A. humilis (L.) Mill. var. echinata (Willd.) Bak. = A. HUMILIS
7400 A. HUMILIS (L.) MILL.
(=A. humilis (L.) Mill. var. acuminata (Haw.) Bak.) #
(=A. humilis (L.) Mill. var. echinata (Willd.) Bak.) #
(=A. humilis (L.) Mill. var. incurva Haw.) #
(=A. humilis (L.) Mill. var. subtuberculata (Haw.) Bak.) #
A. humilis (L.) Mill. var. incurva Haw. = A. HUMILIS
A. humilis (L.) Mill. var. subtuberculata (Haw.) Bak. = A. HUMILIS
5100 A. X ESCULENTA LEACH #
B3S0 A. KOMAGGASENSIS KRITZINGER & V. JAARSVELD 3
A. krapohliana Marloth var. dumoulinii Lavranos = A. KRAPOHLIANA
BS00 A. KRAPOHLIANA MARLOTH
(=A. krapohliana Marloth var. dumoulinii Lavranos) #
A. minima Bak. var. blyderivierensis (Groenewald) Reynolds = A. MINIMA
10200 A. MINIMA BAK.
(=A. minima Bak. var. blyderivierensis (Groenewald) Reynolds) #
11300 A. PARVIBRACTEATA SCHONL.
(=A. parvibracteata Schonl. var. zuluensis Reynolds) #
A. parvibracteata Schonl. var. zuluensis Reynolds = A. PARVIBRACTEATA
11750 A. PERFOLIATA L. #
14050 A. SPICATA L.F. #
A. tenuior Haw. var. decidua Reynolds = A. TENUIOR
A. tenuior Haw. var. densiflora Reynolds = A. TENUIOR
A. tenuior Haw. var. rubriflora Reynolds = A. TENUIOR
15100 A. TENUIOR HAW.
(=A. tenuior Haw. var. decidua Reynolds) #
(=A. tenuior Haw. var. densiflora Reynolds) #
(=A. tenuior Haw. var. rubriflora Reynolds) #

1029000 -HAWORTHIA DUVAL (includes Astroloba Uitew. and Poellnitzia Uitew.) Pevision: B. Bayer (NBG).
2. BAYER. 1982. NEW HAWORTHIA HANDBOOK.
3. SCOTT. 1985. THE GENUS HAWORTHIA
##. PRE HERBARIUM PRACTICE, FOLLOWING BAYER.
H. beukmanii V. Poelln. = H. MIRABILIS
2900 H. COARCTATA HAW.
(=H. fulva G.G. Sm.) 2,3
3600 H. CYMBIFORMIS (HAW.) DUVAL
(=H. planifolia Haw.) 2,3
4600 H. EMELYAE V. POELLN.
H. fulva G.G. Sm. = H. COARCTATA
5900 H. GRANULATA MARLOTH
H. haageana V. Poelln. = H. RETICULATA
7800 H. JANSENEANA UITEW.
8100 H. KOELMANIORUM OBERM. & HAROY
(=H. macmurtryi C.L. Scott) ##
B600 H. LIMIFOLIA MARLOTH VAR. LIMIFOLIA
B650 H. LIMIFOLIA MARLOTH VAR. UBOMBOENSIS (VERDOORN) G.G. SM.
(=H. ubomboensis Verdoorn) 2,3
H. macmurtryi C.L. Scott = H. KOELMANIORUM
9900 H. MIRABILIS (HAW.) HAW.
(=H. beukmanii V. Poelln.) 2,3
(=H. willowmorensis V. Poelln.) 2,3
H. planifolia Haw. = H. CYMBIFORMIS
13B00 H. RETICULATA HAW.
(=H. haageana V. Poelln.) 2,3
H. ubomboensis Verdoorn = H. LIMIFOLIA VAR. UBOMBOENSIS
H. willowmorensis V. Poelln. = H. MIRABILIS

1079000 -ALBUCA L. Pevision: U. Muller-Doblies (Herb. M-D). (All new taxa not evaluated pending revision.)
6. HILLIARD & BURTT. 1982. NOTES R. BOT. GDN EDINB. 42: 227.

1080000 -URGINEA STEINH. Revision: A.A. Mauve (PRE) (All new taxa not evaluated pending revision.)
4. HILLIARD & BURTT. 1984. NOTES ROY. BOT. GARD. EDINB. 42: 227.

10B0010 -TENICROA RAF.
3. SNIJMAN. 1985. S. AFR. J. BOT. 51: 264.
450 T. NANA SNIJMAN 3

1094000 -Pseudogaltonia Kuntze = LINDNERIA
P. clavata (Mast. ex Bak.) Phill. = LINDNERIA CLAVATA

1094010 -LINDNERIA TH. DUR. & LUEBERS
1. SPETA. 1985. BOT. JAHRB. SYST. 106: 123.
100 L. CLAVATA (MAST.) SPETA
(=Pseudogaltonia clavata (Mast. ex Bak.) Phill.) 1

1110000 -SANSEVIERIA THUNB.
3. ROESSLER & MERXMUELLER. 1981. MITT. BOT. STAATSAMML. MUNCHEN. 17: 240.
250 S. LONGIFLORA SIMS 3

AMARYLLIDACEAE 1166000

1166000 -HESSEA HERB. Revision: D. Muller-Doblies (Herb. M-D).
D. Snijman (NBG).
S. MULLER-DOBLIES. 1985. BOT. JAHRB. SYST. 107: 17.
H. bachmanniana Schinz = H. BRACHYSCYPHA
200 H. BRACHYSCYPHA BAK.
(=H. bachmanniana Schinz) S
250 H. BREVIFLORA HERB. S
(=H. dregeana Kunth) S
H. chaplinii W.F. Barker = GEMMARIA CHAPLINII
350 H. CINNABARINA D. & U. MULLER-DOBLIES 5
H. dregeana Kunth = H. BREVIFLORA
H. gemmata (Ker-Gawl.) Benth. = GEMMARIA GEMMATA
H. karooica W.F. Barker = GEMMARIA KAROOICA
H. leipoldtii L. Bol. = GEMMARIA LEIPOLDTII
B50 H. LONGITUBA D. & U. MULLER-DOBLIES 5
H. mathewsii W.F. Barker = GEMMARIA MATHEWSII
950 H. PILOSULA D. & U. MULLER-DOBLIES 5
H. tenella (L. F.) Oberm. = TEDINGEA TENELLA
H. unguiculata W.F. Barker - GEMMARIA UNGUICULATA
1250 H. WEBERLINGIORUM D. & U. MULLER-DOBLIES 5

1166030 -GEMMARIA D. & U. MULLER-DOBLIES
1. MULLER-DOBLIES. 1985. BOT. JAHRB. SYST. 107: 17.
100 G. CHAPLINII (W.F. BARKER) D. & U. MULLER-DOBLIES
(=Hessea chaplinii W.F. Barker) 1
200 G. GEMMATA (KER-GAWL.) SALISB. EX D. & U. MULLER-DOBLIES
(=Hessea gemmata (Ker-Gawl.) Benth.) 1
300 G. KAROOICA (W.F. BARKER) D. & U. MULLER-DOBLIES
(=Hessea karooica W.F. Barker) 1
400 G. KAROOPORTENSIS D. & U. MULLER-DOBLIES
500 G. LEIPOLDTII (L. BOL.) D. & U. MULLER-DOBLIES
(=Hessea leipoldtii L. Bol.) 1
600 G. MASSONIELLA D. & U. MULLER-DOBLIES
700 G. MATHEWSII (W.F. BARKER) D. & U. MULLER-DOBLIES
(=Hessea mathewsii W.F. Barker) 1
800 G. MERXMUELLERANA D. & U. MULLER-DOBLIES
900 G. PULCHERRIMA D. & U. MULLER-DOBLIES
1000 G. UNGUICULATA (W.F. BARKER) D. & U. MULLER-DOBLIES
(=Hessea unguiculata W.F. Barker) 1

1166040 -NAMAQUANULA D. & U. MULLER-DOBLIES
1. MULLER-DOBLIES. 1985. BOT. JAHRB. SYST. 107: 17.
N. BRUCE-BAYERI O. & U. MULLER-DOBLIES

1166050 -TEDINGEA D. & U. MULLER-DOBLIES
1. MULLER-DOBLIES. 1985. BOT. JAHRB. SYST. 107: 17.
T. TENELLA (L. F.) D. & U. MULLER-DOBLIES
(=Hessea tenella (L. f.) Oberm.) 1

1171000 -STRUMARIA JACQ. EX WILLD. Revision: O. Muller-Doblies (Herb. M-D).
D. Snijman (NBG)
3. MULLER-DOBLIES. 1985. BOT. JAHRB. SYST. 107: 17.
250 S. HARDYANA D. & U. MULLER-DOBLIES 3
S. picta W.F. Barker = BOKKEVELDIA PICTA
S. pubescens W.F. Barker = BOKKEVELOIA PUBESCENS
S. salteri W.F. BARKER = BOKKEVELDIA SALTERI
S. watermeyeri L. Bol. = BOKKEVELDIA WATERMEYERI SUBSP. WATERMEYERI

1171010 -BOKKEVELOIA D. & U. MULLER-DOBLIES
1. MULLER-DOBLIES. 1985. BOT. JAHRB. SYST. 107: 17.
100 B. PICTA (W.F. BARKER) D. & U. MULLER-DOBLIES
(=Strumaria picta W.F. Barker) 1
200 B. PUBESCENS (W.F. BARKER) D. & U. MULLER-DOBLIES
(=Strumaria pubescens W.F. Barker) 1
300 B. SALTERI (W.F. BARKER) D. & U. MULLER-DOBLIES
(=Strumaria salteri W.F. Barker) 1
400 B. WATERMEYERI (L. BOL.) D. & U. MULLER-DOBLIES SUBSP. BOTTERKLOOFENSIS D. & U. MULLER-DOBLIES
500 B. WATERMEYERI (L. BOL.) D. & U. MULLER-DOBLIES SUBSP. WATERMEYERI
(=Strumaria watermeyeri L. Bol.) 1

1175000 -NERINE HERB.
4. DOUGLAS. 1985. BOTHALIA 15: 545.
N. flexuosa (Jacq.) Herb. p.p. = N. HUMILIS
950 N. HUMILIS (JACQ.) HERB.
(=N. flexuosa (Jacq.) Herb. p.p.) 4
(=N. pulchella Herb.) 4
(=N. tulbaghensis W.F. Barker) 4

N. pulchella Herb. = N. HUMILIS
N. tulbaghensis W.F. Barker = N. HUMILIS

1186000 -GETHYLLIS L. Revision: O. Muller-Ooblies (Herb. M-D).
#. PRE HERBARIUM PRACTICE, FOLLOWING MULLER-OOBLIES.
100 G. AFRA L.
(=G. pusilla Bak.) #
G. angelicae Ointer & Schulze = G. NAMAQUENSIS
500 G. CILIARIS (THUNB.) THUNB. (Note author change)
(=G. longituba L. Bol.) #
1000 G. LONGISTYLA H. BOL. (Note author change)
G. longituba L. Bol. = G. CILIARIS
1250 G. NAMAQUENSIS (SCHONL.) OBERM.
(=G. angelicae Ointer & Schulze) #
G. pusilla Bak. = G. AFRA
1600 G. SPIRALIS (THUNB.) THUNB. (Note author change)
2000 G. VERTICILLATA R. BR. EX HERB. (Note author change)

1191000 -CYRTANTHUS L. F.
6. REID & OYER. 1984. REVIEW S.A. CYRTANTHUS.
##. PRE HERBARIUM PRACTICE, FOLLOWING B.L. BURTT.
1050 C. ELATUS (JACQ.) TRAUB
(=C. purpureus (Ait.) Traub) ##
C. purpureus (Ait.) Traub = C. ELATUS

IRIDACEAE 1259000

1261000 -ROMULEA MARATTI
R. spiralis (Burch.) Bak. = GEISSORHIZA SPIRALIS

1262000 -GALAXIA THUNB.
2. GOLDBLATT. 1985. ANN. MISSOURI BOT. GARD. 71:1082.
360 G. KAMIESMONTANA GOLOBL. 2
410 G. PARVA GOLDBL. 2

1300000 -GEISSORHIZA KER-GAWL.
4. GOLOBLATT. 1985. ANN. MISSOURI BOT. GARO. 72: 277.
50 G. ALTICOLA GOLOBL. 4
70 G. ARENICOLA GOLDBL. 4
150 G. BARKERAE GOLDBL. 4
G. bicolor (Thunb.) N.E. Br. var. bicolor = G. IMBRICATA SUBSP. BICOLOR
G. bicolor (Thunb.) N.E. Br. var. macowanii R.C. Fost. = G. IMBRICATA SUBSP. BICOLOR
500 G. BOLUSII BAK.
(=G. dregei Bak.) 4
(=G. rupestris Schltr.) 4
550 G. BONAE-SPEI GOLOBL. 4
(=Engysiphon pictus (R.C. Fost.) G.J. Lewis sensu G.J. Lewis) 4
650 G. BREHMII ECKL. EX KLATT
(=G. teretifolia G.J. Lewis) 4
670 G. BREVITUBA (G.J. LEWIS) GOLOBL. 4
(=Engysiphon brevitubus G.J. Lewis) 4
690 G. BRYICOLA GOLOBL. 4
720 G. CATARACTARUM GOLDBL. 4
750 G. CEDARMONTANA GOLDBL. 4
770 G. CILIATULA GOLOBL. 4
790 G. CONFUSA GOLOBL. 4
(=Engysiphon exscapus (Thunb.) G.J. Lewis sensu G.J. Lewis) 4
820 G. DARLINGENSIS GOLOBL. 4
850 G. DELICATULA GOLDBL. 4
870 G. DIVARICATA GOLDBL. 4
G. dregei Bak. = G. BOLUSII
920 G. ELSIAE GOLDBL. 4
940 G. ERUBESCENS GOLOBL. 4
960 G. ESTEPHUYSENIAE GOLOBL. 4
970 G. EURYSTIGMA L. BOL.
(=G. mathewsii L. Bol. var. eurystigma (L. Bol.) R.C. Fost.) 4
(=G. monantha Sweet) 4
(=G. rochensis (Ker-Gawl.) var. spithamaea (Ker-Gawl.) Bak.) 4
980 G. EXSCAPA (THUNB.) GOLDBL. 4
(=Engysiphon exscapus (Thunb.) G.J. Lewis) 4
(=Engysiphon longitubus G.J. Lewis) 4
1350 G. GRANDIFLORA GOLOBL. 4
1500 G. HETEPOSTYLA L. BOL.
(=G. rogersii N.E. Br.) 4
(=G. rosea (Klatt) R.C. Fost.) 4
1550 G. HISPIOULA (R.C. FOST.) GOLDBL. 4
(=G. humilis (Thunb.) Ker-Gawl. var. bicolor Bak.) 4
(=G. humilis (Thunb.) Ker-Gawl. var. hispidula R.C. Fost.) 4
G. humilis (Thunb.) Ker-Gawl. var. bicolor Bak. = G. HISPIOULA
G. humilis (Thunb.) Ker-Gawl. var. hispidula R.C. Fost. = G. HISPIDULA
1800 G. HUMILIS (THUNB.) KER-GAWL.
1850 G. IMBRICATA (OELAROCHE) KER-GAWL. SUBSP. BICOLOR (THUNB.) GOLOBL. 4
(=G. bicolor (Thunb.) N.E. Br. var. bicolor) 4
(=G. bicolor (Thunb.) N.R. Br. var. macowanii R.C. Fost.) 4
(=G. imbricata (Delaroche) Ker-Gawl. var. concolor Bak.) 4
(=G. rubicunda R.C. Fost.) 4
G. imbricata (Delaroche) Ker-Gawl. var. concolor Bak. = G. IMBRICATA SUBSP. BICOLOR
2100 G. IMBRICATA (DELAROCHE) KER-GAWL. SUBSP. IMBRICATA
(=G. sulphurea Schltr. var arenicola R.C. Fost.) 4
(=G. wrightii Bak.) 4
2300 G. INCONSPICUA BAK.
(=G. violacea Bak.) 4
2500 G. INFLEXA (DELAROCHE) KER-GAWL. 4
(=G. inflexa (Delaroche) Ker-Gawl. var. erosa (Salisb.) Goldbl.) 4
G. inflexa (Delaroche) Ker-Gawl. var. erosa (Salisb.) Goldbl.) = G. INFLEXA
2550 G. INTERMEDIA GOLDBL. 4
2820 G. KAMIESMONTANA GOLDBL. 4
2840 G. KAROOICA GOLDBL. 4
G. lewisiae R.C. Fost. = G. MONANTHOS
3020 G. LITHICOLA GOLOBL. 4
3050 G. LONGIFOLIA (G.J. LEWIS) GOLDBL. 4
(=Engysiphon longifolius G.J. Lewis) 4
G. louisabolusiae R.C. Fost. var. longifolia R.C. Fost. = G. LOUISABOLUSIAE
3200 G. LOUISABOLUSIAE R.C. FOST.
(=G. louisabolusiae R.C Fost. var. longifolia R.C. Fost.) 4
G. marlothii R.C. Fost. = G. ORNITHOGALOIDES SUBSP. MARLOTHII
G. mathewsii L. Bol. var. eurystigma (L. Bol.) R.C. Fost. = G. EURYSTIGMA
3600 G. MATHEWSII L. BOL.
3620 G. MINUTA GOLOBL. 4
G. monantha Sweet = G. EURYSTIGMA
3700 G. MONANTHOS ECKL.
(=G. lewisiae R.C. Fost.) 4
G. montana R.C. Fost. = G. RAMOSA
4020 G. NIGROMONTANA GOLDBL.
4050 G. NUBIGENA GOLDBL. 4
G. ornithogaloides Klatt var. flava (Klatt) R.C. Fost. = G. ORNITHOGALOIDES SUBSP. ORNITHOGALOIDES
4150 G. ORNITHOGALOIDES KLATT SUBSP. MARLOTHII (R.C. FOST.) GOLOBL. 4
(=G. marlothii R.C. Fost.) 4
4200 G. ORNITHOGALOIDES KLATT SUBSP. ORNITHOGALOIDES
(=G. ornithogaloides Klatt var. flava R.C. Fost.) 4
4250 G. OUTENIQUENSIS GOLDBL. 4
4620 G. PSEUDINAEQUALIS GOLDBL. 4
4650 G. PURPURASCENS GOLOBL. 4
4700 G. PURPUREOLUTEA BAK.
(=G. sulphurea Schltr. var. sulphurea) 4
4900 G. RAMOSA KER-GAWL. EX KLATT
(=G. montana R.C. Fost.) 4
G. rochensis Ker-Gawl. var. spithamaea (Ker-Gawl.) Bak. = G. EURYSTIGMA
G. rogersii N.E. Br. = G. HETEPOSTYLA
G. rosea (Klatt) R.C. Fost. = G. HETEROSTYLA
5350 G. ROSEOALBA (G.J. LEWIS) GOLOBL. 4
(=Engysiphon roseoalbus (G.J. Lewis) G.J. Lewis) 4
G. rubicunda R.C. Fost. = G. IMBRICATA SUBSP. BICOLOR
G. rupestris Schltr. = G. BOLUSII
5510 G. SCHINZII (BAK.) GOLOBL. 4
(=Engysiphon schinzii (Bak.) G.J. Lewis) 4
5540 G. SCOPULOSA GOLDBL. 4
5650 G. SIMILIS GOLDBL. 4
5750 G. SPIRALIS (BURCH.) OE VOS EX GOLOBL. 4
(=Romulea spiralis (Burch.) Bak.) 4
5770 G. STENOSIPHON GOLDBL. 4
G. sulphurea Schltr. var. arenicola R.C. Fost. = G. IMBRICATA SUBSP. IMBRICATA
G. sulphurea Schltr. var. sulphurea = G. PURPUREOLUTEA
6020 G. TABULARIS GOLDBL. 4
6050 G. TENELLA GOLDBL. 4
(=Engysiphon roseus (Schinz) G.J. Lewis) 4
G. teretifolia G.J. Lewis = G. BREHMII
6300 G. TULBAGHENSIS F. BOL.
6450 G. UNIFOLIA GOLDBL. 4
G. violacea Bak. = G. INCONSPICUA
G. wrightii Bak. = G. IMBRICATA SUBSP. IMBRICATA

1300010 -Engysiphon G.J. Lewis = GEISSORHIZA
E. brevitubus G.J. Lewis = GEISSORHIZA BREVITUBA
E. exscapus (Thunb.) G.J. Lewis sensu G.J. Lewis = GEISSORHIZA CONFUSA & G. EXSCAPA
E. longifolius G.J. Lewis = GEISSORHIZA LONGIFOLIA
E. longitubus G.J. Lewis = GEISSORHIZA EXSCAPA
E. pictus (R.C. Fost.) G.J. Lewis sensu G.J. Lewis = GEISSORHIZA BONAE-SPEI
E. roseoalbus (G.J. Lewis) G.J. Lewis = GEISSORHIZA ROSEOALBA
E. roseus (Schinz) G.J. Lewis = GEISSORHIZA TENELLA
E. schinzii (Bak.) G.J. Lewis = GEISSORHIZA SCHINZII

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1302000   -IXIA L.
               3. GOLDBLATT & SNIJMAN. 1985. S. AFR. J.
                  BOT. 51: 66.
     650    I. COLLINA GOLDBL. & SNIJMAN 3
    4450    I. PUMILIO GOLDBL. & SNIJMAN 3

1306030   -CHASMANTHE N.E. BR.
               2. DE VOS. 1985. S. AFR. J. BOT. 51: 253.
     100    C. AETHIOPICA (L.) N.E. BR.
                  (=C. peglerae N.E. Br.) 2
                  (=C. vittigera (Salisb.) N.E. Br.) 2
     200    C. BICOLOR (GASP. EX TENORE) N.E. BR.
     250    C. FLORIBUNDA (SALISB.) N.E. BR. VAR. DUCKITTII
                  G.J. LEWIS EX L. BOL.
     300    C. FLORIBUNDA (SALISB.) N.E. BR. VAR. FLORIBUNDA
            C. peglerae N.E. Br. =  C. AETHIOPICA
            C. vittigera (Salisb.) N.E. Br. =  C. AETHIOPICA

ZINGIBERACEAE                                          1324000

1342000   -HEDYCHIUM KOENIG
     100    H. CORONARIUM KOENIG  *

ORCHIDACEAE                                            1389000

1434000   -DISA BERG.
               4. VLOK. 1985. S. AFR. J. BOT. 51: 335.
               5. LINDER. 1985. BOTHALIA 15: 553.
     135    D. APIDA VLOK 4
    2850    D. LUTEA LINDER
                  (=D. patens (L. F.) Thunb.) 5
            D. patens (L. F.) Thunb. =  D. LUTEA

1435000   -Herschelia Lindl. =  HERSCHELIANTHE
            H. barbata (L. F.) H. Bol. =  HERSCHELIANTHE
                  BARBATA
            H. baurii (H. Bol.) Kraenzl. =  HERSCHELIANTHE
                  BAURII
            H. forcipata (Schltr.) Kraenzl. =  HERSCHELIANTHE
                  FORCIPATA
            H. forficaria (H. Bol) Linder =  HERSCHELIANTHE
                  FORFICARIA
            H. graminifolia (Ker-Gawl. ex Spreng.) Dur. &
                  Schinz =  HERSCHELIANTHE
                  GRAMINIFOLIA
            H. hians (L. f.) A.V. Hall =  HERSCHELIANTHE
                  HIANS
            H. lugens (H. Bol.) Kraenzl. var. lugens =
                  HERSCHELIANTHE LUGENS VAR.
                  LUGENS
            H. lugens (H. Bol.) Kraenzl. var. nigrescens =
                  HERSCHELIANTHE LUGENS VAR.
                  NIGRESCENS
            H. multifida (Lindl.) Rolfe =  HERSCHELIANTHE
                  MULTIFIDA
            H. newdigateae (L. Bol.) Linder =  HERSCHELIAN-
                  THE NEWDIGATEAE
            H. purpurascens (H. Bol.) Kraenzl. =  HERSCHEL-
                  IANTHE PURPURASCENS
            H. schlechteriana (H. Bol.) Linder =  HERSCHEL-
                  IANTHE SCHLECHTERIANA
            H. spathulata (L. f.) Rolfe subsp. spathulata =
                  HERSCHELIANTHE SPATHULATA
                  SUBSP. SPATHULATA
            H. spathulata (L. f.) Rolfe subsp. tripartita =
                  HERSCHELIANTHE SPATHULATA
                  SUBSP. TRIPARTITA
            H. venusta (H. Bol.) Kraenzl. =  HERSCHELIANTHE
                  VENUSTA

1435010   -HERSCHELIANTHE RAUSCHERT
               1.  RAUSCHERT. 1983. FEDDES REPRIUM. 94:
                  433.
               2.  ANTHONY. 1985. BOTHALIA 15: 554.
     100    H. BARBATA (L. F.) N.C. ANTHONY
                  (=Herschelia barbata (L. F.) H. Bol.) 2
     200    H. BAURII (H. BOL.) RAUSCHERT
                  (=Herschelia baurii (H. Bol.) Kraenzl.)
                  1
     300    H. FORCIPATA (SCHLTR.) RAUSCHERT
                  (=Herschelia forcipata (Schltr.)
                  Kraenzl.) 1
     400    H. FORFICARIA (H. BOL.) N.C. ANTHONY
                  (=Herschelia forficaria (H. Bol.)
                  Linder) 2
     500    H. GRAMINIFOLIA (KER.-GAWL. EX SPRENG.)
                  RAUSCHERT
                  (=Herschelia graminifolia (Ker-Gawl. ex
                  Spreng.) Dur. & Schinz) 1
     600    H. HIANS (L. F.) RAUSCHERT
                  (=Herschelia hians (L. f.) A.V. Hall) 1
     700    H. LUGENS (H. BOL.) RAUSCHERT VAR. LUGENS
                  (=Herschelia lugens (H. Bol.) Kraenzl.
                  var. lugens
     800    H. LUGENS (H. BOL.) RAUSCHERT VAR. NIGRESCENS
                  (LINDER) N.C. ANTHONY
                  (=Herschelia lugens (H. Bol.) Kraenzl.
                  var. nigrescens Linder) 2
     900    H. MULTIFIDA (LINDL.) RAUSCHERT
                  (=Herschelia multifida (Lindl.) Rolfe
    1000    H. NEWDIGATEAE (L. BOL.) N.C. ANTHONY
                  (=Herschelia newdigateae (L. Bol.)
                  Linder)  2
    1100    H. PURPURASCENS (H. BOL.) RAUSCHERT
                  (=Herschelia purpurascens (H. Bol.)
                  Kraenzl.) 1
    1200    H. SCHLECHTERIANA (H. BOL.) N.C. ANTHONY
                  (=Herschelia schlechteriana (H. Bol.)
                  Linder) 2
    1300    H. SPATHULATA (L. F.) RAUSCHERT SUBSP. SPATHULATA
                  (=Herschelia spathulata (L. f.) Rolfe
                  subsp. spathulata) 1
    1400    H. SPATHULATA (L. F.) RAUSCHERT SUBSP. TRIPAR-
                  TITA (LINDL.) N.C. ANTHONY
                  (=Herschelia spathulata (L. f.) Rolfe
                  subsp. tripartita (Lindl.)
                  Linder) 2
    1500    H. VENUSTA (H. BOL.) RAUSCHERT
                  (=Herschelia venusta (H. Bol.) Kraenzl.)
                  1

1439000   -CERATANDRA ECKL. EX BAUER
               #. PRE HERBARIUM PRACTICE, FOLLOWING N.C.
                  ANTHONY.
     350    C. GRANDIFLORA X ATRATA

1830000   -AERANGIS REICHB. F.
      50    A. KIRKII (REICHB. F.) SCHLTR.
                  East African species collected in Natal.
                  2732 (Ubombo): Sihadla River crossing
                  (-BB), Killick & Vahrmeijer 4064.
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UITTREKSEL

Veranderings aan die inventaris wat in PRECIS vir die briofiete, pteridofiete en monokotiele gehandhaaf word, word hier vir die jaar 1985 gerapporteer. Daar is altesame 108 nuut-beskryfde taksa, agt taksa wat as nuut vir Suidelike-Afrika gerapporteer is en 284 naamsveranderings. Die totale som van 400 veranderings verteenwoordig 6% van die totale aantal taksa in hierdie plant groep.

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GIBBS RUSSELL, G. E., WELMAN, W. G., GERMISHUIZEN, G., RETIEF, E. & PIENAAR, B. J. in prep. List of species of southern African plants, edn 2, part 2, Dicotyledons. *Mem. bot Surv. S. Afr.*

Bothalia 16,1: 119–133 (1986)

REVIEW OF THE WORK OF THE BOTANICAL RESEARCH INSTITUTE, 1984/85

1st April 1984 — 31st March 1985

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INTRODUCTION

Whereas excellent progress is being made on a variety of research facets concerned with botanical topics of high priority it is a disconcerting fact that the two main projects of the Botanical Research Institute, namely the *Flora of southern Africa* and vegetation surveys are lagging behind because of insufficient support. These projects are of vital concern to our future because they are designed to supply information on which management of vegetation, essential for maintaining the plant cover of our country, is based. Maintaining an adequate plant cover is the only way in which desertification, the scourge of Africa which threatens our very existence, can be avoided. It is a fact that insufficient funds and manpower cannot be advanced as a reason for lack of support. State funds are being found for creating other botanical posts of a much less urgent nature. As pointed out before, the lack of support for priorities as vital as these, can only be attributed to the fragmented state of botany and biology as a whole in South Africa. Can we allow this state of affairs, which threatens our future, to continue?

FLORA RESEARCH DIVISION

Flora of southern Africa (FSA)

The Department has again supported the *Flora of southern Africa* subproject, both nationally and internationally, by awarding a research contract to a contributor at a South African university and a fellowship to an overseas contributor. The third meeting of the *FSA* working group was held during the Congress of the South African Association of Botanists, and such meetings will be held at all future SAAB Congresses. News of interest to *FSA* contributors is circulated in *Forum Botanicum*, the newsletter of SAAB.

One fascicle was published: Vol. 28,4 (Dr L. E. Codd) covering the whole of the family Lamiaceae, with 37 genera and 232 species. Mr M. Iwarsson of Uppsala contributed the genus *Leonotis*. Three fascicles are in press, and may be published during 1985: Vol. 4,2 dealing with the families Xyridaceae, Eriocaulaceae, Commelinaceae, Pontederiaceae and Juncaceae, by Mrs A. A. Obermeyer (Mauve), with Mr J. Lewis of the British Museum (part of Xyridaceae) and Dr R. B. Faden of the Smithsonian Institution, USA (co-author of Commelinaceae and author of *Aneilema*); Vol. 14 on Crassulaceae by Dr H. R. Tölken, formerly a member of the BRI, but now at the Herbarium in Adelaide, Australia; and the volume on Pteridophyta by Prof. E. A. Schelpe and N. C. Anthony of the University of Cape Town. Vol. 31,1,2 dealing with the family Rubiaceae (subfamily Rubioideae) by Dr Ch. Puff of the University of Vienna, Austria, is at an advanced stage of editing and will go to press in 1985.

The *List of Species of Southern African Plants*, Edn 2, Part 1, covering cryptogams, gymnosperms and monocots is with the printer and will appear in 1985. This second edition includes references to the literature necessary to name plants in each genus, as well as recent synonyms. The *List of Species* is intended to serve as a precursor to the *FSA*, and provides an overview of the southern African flora until the *FSA* is complete.

A Catalogue of South African Green, Brown and Red Marine Algae, compiled by Prof. S. C. Seagrief of Rhodes University was published.

Institute members, and outside contributors on contract or fellowship, made the following progress with research facets on volumes of the *FSA*:

Lichens: Dr O. Almborn of Lund, Sweden, is continuing to co-ordinate a volume on lichens, and has enrolled 28 contributors, covering most of the families.

Bryophyta: Work on Fascicle 2, covering Funariales to Bryales was completed in 1982 by Dr R. E. Magill of the Missouri Botanical Garden, USA, except for the genus *Bryum*, which will shortly be completed by Mr J. van Rooy. Dr. Magill is now working on Fascicle 3.

Vol. 2: Poaceae. Computerization of the Register of Names and Types was completed by Dr G. E. Gibbs Russell and transferred to the PRECIS Herbarium database, as a beginning to the redevelopment of the bibliographic component that was originally planned.

Oryzoideae, Centostecoideae and Bambusoideae. The genus *Ehrharta* was studied in the field by Dr G. E. Gibbs Russell, emphasizing intraspecific variation between isolated mountain groups of the south-western Cape. In Oryzoideae taxa were delimited and keys written.

Poeae and Bromeae. Dr H. P. Linder, as light relief from his study of Restionaceae, has written the *FSA* account of about 45 species in these

tribes. Many of the species are naturalized aliens from Europe, and the study was completed efficiently while he was serving as Liaison Officer at Kew Herbarium.

Vol. 4: Restionaceae. The conspectus of the family, including nomenclature, keys, descriptions of new species, formal new combinations and notes on the taxonomy, ecology and distribution of the taxa was completed by Dr H. P. Linder and is in press in *Bothalia.* About 320 species are recognized, including 55 new species and 83 new combinations. This is the first large family to be treated first as a conspectus for the *FSA.*

Xyridaceae, Eriocaulaceae, Commelinaceae, Pontederiaceae and Juncaceae. Fascicle 4,2, by Mrs A. A. Obermeyer (Mauve), is with the printer.

Vol. 5: Asparagaceae. Mrs A. A. Obermeyer (Mauve) has completed her study of the two genera *Protasparagus* and *Myrsiphyllum*, and the treatment of the latter was published in *Bothalia.* Where previously one genus *(Asparagus)* with 44 species was recognized, the new classification has two genera and 77 species.

Vol. 8: Orchidaceae. Prof E. A. Schelpe, of the University of Cape Town, on contract to the Department, has continued work on this volume, assisted by Mrs N. C. Anthony. About a third of the species are completed.

Vol. 9: Salicaceae, Fagaceae, Urticaceae and Piperaceae. Miss K. L. Immelman is well advanced with her studies of *Salix, Populus* and *Quercus.* She has completed work on the two genera in Piperaceae, *Piper* and *Peperomia.*

Vol. 11: Mesembryanthemaceae. Dr H. F. Glen is preparing manuscripts of *Astridia, Acrodon* and *Ebracteola* for *Bothalia.*

Vol. 16: Fabaceae — Desmodieae. Mr B. Schrire has completed his thesis on this group, and has rewritten the account as a revision to appear in *Bothalia.*

Vol. 25: Ericaceae. Mr E. G. H. Oliver completed revisions of the minor genera *Salaxis, Coccosperma* and *Scyphogyne.* Research continues on *Ericinella, Philippia, Sympieza, Aniserica* and *Blaeria,* where limits between the genera must be more securely drawn. Special studies were made of inflorescence structure, seed and fruit types.

Vol. 28: Lamiaceae. The *FSA* treatment of the family, by Dr L. E. Codd, was published.

Vol. 30: Acanthaceae — *Justicia.* Miss K. L. Immelman completed *FSA* accounts of *Justicia* and *Siphonoglossa.* The genus *Aulojusticia* was placed in synonymy with *Siphonoglossa* and a new species described.

Vol. 31: Rubiaceae — Rubioideae – Paederieae, Anthospermeae, Rubieae. Dr Puff completed this account of about 60 species while holding a Departmental Research Fellowship. The manuscript is being edited and will be in press shortly.

Pretoria Flora

The families Asclepiadaceae, Periplocaceae, Vitaceae and Myrtaceae were completed. Several other families were modified in the light of new revisions. To date, 542 camera-ready pages have been produced.

Palaeoflora of southern Africa

Prodromus of South African Megafloras, Devonian to Lower Cretaceous, written by Drs J. M. Anderson and H. M. Anderson, and published by A. A. Balkema, is with the printer. It deals with all plant fossils known to have occurred in southern Africa during the period when all the continents were united in the single supercontinent, Pangaea. The book also includes detailed biographical information about the principal collectors of fossil plants in southern Africa.

Liaison Officer, Kew

Dr H. P. Linder has served at Kew for a third year, and has provided information about taxonomic and related subjects to researchers on the southern African flora both from South Africa and from overseas. His research has been concentrated on the Restionaceae and its hypothetical sister-group, the Poaceae.

DATA SUB-DIVISION

Data Sub-Division serves the needs of the Institute for electronic data processing on the Burroughs 7900 computer of the Department and a Hewlett-Packard 9845B microcomputer. Large systems maintained on the Burroughs include: PRECIS, the Herbarium database managed by Mr N. P. Barker is the largest of its kind in the world, recording specimen label information for over 600 000 herbarium specimens. In the past year PRECIS has been expanded by Dr G. E. Gibbs Russell to include a taxon-based set of on-line data files that record the most recent treatment of all 24 000 plant taxa in southern Africa, with synonyms and literature references. A beginning has been made in developing the bibliographic component originally planned for PRECIS. PHYTOTAB is a suite of programs and a database for managing spatial and temporal sampling of vegetation, and is managed by Mr M. D. Panagos. Information from past vegetation studies, as well as those currently under way, are being entered into PHYTOTAB, and a link between PHYTOTAB and PRECIS will allow automatic updating of plant names so that studies of various ages can be compared. The Garden Records system, developed and maintained by Mrs B. C. de Wet, continues to process new material added to the Pretoria National Botanical Garden. Miss A. P. Backer is developing a database of photographic records for Vegetation Ecology Division.

Smaller systems maintained on the Hewlett-Packard microcomputer are the address labels for the Institute, and programs to prepare distribution maps, specimen labels and determinavit slips for taxonomic researchers. A database of grass chromosome numbers was set up by Mr J. J. Spies, and Mr T. H. Ar-

nold is developing a database of food plant records. The National Working Group for Vegetation Ecology has records of all researchers and projects in vegetation ecology, and the Flora Research Team has a database to hold the *Register of Southern African Plant Taxonomic Projects.*

HERBARIUM DIVISION

The four herbaria of the Institute continued to identify plants and provide information to a wide range of people including officers of this Institute, various state and provincial departments, universities and the general public, both in the Republic of South Africa and its neighbouring states. The research input of the herbarium staff is also gaining momentum with a total of 12 registered facets.

National Herbarium, Pretoria (PRE)

Until her retirement in September, 1984, Mrs E. van Hoepen was acting curator of the Herbarium Division, assisted by Miss W. G. Welman (finances). In October 1984, Mr T. H. Arnold was appointed as curator.

During the year 16 501 specimens were named and 22 449 specimens accessioned. 62 loans (4 253 specimens) were sent to other institutes and 43 loans (4 252 specimens) were received. PRE sent out 4 770 duplicates asnd received 4 111 in exchange.

Collecting expeditions were undertaken to areas where the vegetation had recovered sufficiently from the drought. This included trips to the northern and north-western Transvaal, the eastern Transvaal, the Natal Drakensberg, Transkei and northern Natal. Two officers went to Tongoland to carry out a survey of potential weeds which may affect the rice-growing project planned for the region.

No new herbarium cabinets were installed and the proposed fire protection was postponed until 1989/90. Plans have, however, been approved for the installation of three more working bays on the south side of each wing. This will greatly relieve congestion, especially when visitors have to be accommodated for any length of time.

Visitors to the National Herbarium numbered about 700. These included: Prof. O. H. Volk, West Germany (Hepaticae); Dr Ch. Puff, Austria (Rubiaceae); Prof. U. Müller-Doblies, West Germany (Amaryllidaceae); Mr F. White, England (Meliaceae); Mr B. L. Burtt, Scotland (southern Drakensberg plants); Prof. O. M. Hilliard, Natal (southern Drakensberg plants); Dr S. Talukdar, Lesotho (Lesotho plants); and Dr J. Prior, England (various taxa). South African visitors included staff and students from several universities, state departments, nature conservation departments and Philatelic Services.

Wing A: Miss C. Reid is responsible for identifications of Pteridophytes and all Monocotyledons with the exception of Poaceae. She has a special interest in the Cyperaceae and intends revising the genus *Carex* for an M.Sc. degree. During the year she completed the list of synonyms of all taxa in her section and this work, together with the Poaceae compiled by Miss L. Smook, has gone to press as Vol. I of a second edition of the List of Species of Southern African Plants, *Mem. bot. Surv. S. Afr.* No. 48. (The part on Dicotyledons is in preparation.)

Miss L. Smook deals with all identifications of Poaceae. She undertook a number of collecting expeditions aimed at filling in gaps in the Poaceae collections. This work forms part of her project on collecting specimens in all under-collected areas in southern Africa. On one of her expeditions (to the Transkei) she collected flowering material of *Bambusa balcooa*, and thus verified the identity of this species in South Africa.

Wing B: Mr G. Germishuizen is writing up his study of the Polygonaceae in Flora format, for publication in the *Flora of southern Africa.* He has commenced work on a second volume of *Transvaal Wild Flowers* in collaboration with the artist Mrs A. Fabian. About 40 plants have been illustrated to date. He is mainly responsible for identifying the Fabaceae and for curating the spirit collection.

Mrs B. J. Pienaar, who assists with general identification, is engaged in a taxonomic study of the genus *Vigna* with the view to obtaining her M.Sc. degree. In addition, she is responsible for all identifications of exotic plants.

Wing C: Miss E. Retief has a special interest in the identification of taxa from seeds and fruits and is concentrating on the Cucurbitaceae. Examining both macro- and microscopic features of the seeds and fruits, she hopes to better delineate the supraspecific taxa in the family.

Miss K. L. Immelman is seconded on a part-time basis from the Flora to the Herbarium Division. She is responsible for general identifications in this wing and is helping Wing B with the identification of Capparaceae and Crassulaceae and some early dicot. families.

Mr A. A. Balsinhas, a member of the Plant Exploration Division, has worked in Wing C every afternoon since 11 May 1984, doing general identifications and, thanks to his good work, Wing C has now caught up with its backlog of identifications.

Wing D: Although Miss W. G. Welman does general identifications in this wing, her special interest is the Asteraceae. She acted as assistant (finances) to the acting curator of the section and in the absence of the curator assumes responsibility for the Division. She continues to be active as regional abstractor for *Excerpta Botanica (Taxonomica).*

Mrs M. J. A. W. Crosby assists with general identification in Wing D, and has also given much appreciated help in Wing B, where a backlog in identifications has built up since January 1984. In addition, she administers the Staff Gift Fund.

All professional officers in Wings B, C and D have been involved in work on the list of synonyms to be published as Vol. 2 of a second edition of the Species List (*Mem. bot. Surv. S. Afr.* No. 48). (Vol. 1, Monocotyledons, has already gone to press).

Cryptogams: Mr J. van Rooy, in charge of the moss herbarium, is working on Bryaceae and Psychomitriaceae for the *Flora of southern Africa.* He

has prepared a checklist of the South West African/ Namibian bryophytes for two papers on the bryoflora of that region.

Mrs S. M. Perold assists with identifications in the moss herbarium, specializing in Ricciaceae, which she has been studying for several years. Most of her time, however, is taken up by the SEM, for which she is responsible. The technical assistance she gives to members of staff who make use of this microscope is invaluable.

Mr F. A. Brusse is in charge of the lichen collection, which he continues to enlarge and bring up to date. The collection has been moved to Room B16, where it is adequately housed at present.

Service Room: Mrs M. Dednam continues to attend to all specimens sent in for identification, e.g. freezing, preparing for sorting, listing and labelling for mounting.

In December 1984 she was joined by Mrs M. Z. Heymann, who attends to all loans and exchanges. Mrs A. M. Verhoef, who types all labels for specimens as well as parcel forms, is carrying on steadily but has a mountainous backlog (12 months) of labels to cope with.

Natal Herbarium, Durban (NH)

Identifications of plant specimens totalled 4 268, 397 visitors were received, 661 specimens were sent out on loan, and accessions to the herbarium numbered 2 672.

Mr B. D. Schrire, curator of the Herbarium and officer in charge of the Unit, completed his work on the tribe Desmodieae for his M.Sc. thesis, which has been submitted to the University of Durban-Westville. Mrs M. Jordaan is responsible for practically all identifications. Dr V. G. Coetzee, half-day technician who assisted Mrs Jordaan, left at the end of April 1984 and was not replaced. Mr A. Ngwenya, laboratory assistant, has been trained by Mr Schrire to help with some identifications, mainly in Fabaceae.

All fungus specimens were sent to Pretoria to the National Fungus Collection. The cultivated section is much improved, due to voluntary collecting of specimens in gardens and parks in the Durban area by a pensioner, Mr H. Adamson.

Five units of air-conditioners were installed in the herbarium building. This has enormously improved the storage environment for valuable books and specimens and has made working conditions more bearable, especially during the hot and humid summer days.

Albany Museum, Grahamstown (GRA)

2 567 plant specimens were identified, 893 visitors were attended to, 917 specimens sent out on loan and accessions totalled 1 898; 976 specimens were donated to the herbarium. The staff was responsible for 125 displays in the Museum foyer.

Mrs E. Brink is in charge of the Unit, and is responsible for all administrative duties, as well as part of the identification service. Dr A. F. M. G. Jacot Guillarmod, part-time researcher, assists with identifications and displays, and is responsible for numerous publications.

After spending almost the whole year in temporary quarters, the herbarium moved to new spacious offices during the last two weeks in February 1984, and is now housed in comfort.

Since September 1984 a systematic effort has been made to rid the Grahamstown Nature Reserve of alien invaders encroaching along its boundaries. The herbarium laboratory assistant and general assistant are helping the Nature Reserve caretaker three days per week with the heavy manual labour.

Mr Neil Abrahams, a voluntary worker, assists with labelling and mounting of specimens, indexing of reprints, and any other work needing to be done. During the move to the new quarters his help was invaluable, and the staff are deeply indebted to him.

Government Herbarium, Stellenbosch (STE)

A total of 2 565 specimens was identified, 334 visitors were attended to, accessions to the herbarium numbered 2 524 and 446 specimens were sent out on loan.

Mrs C. M. van Wyk acted as curator of the herbarium, and was responsible for a great deal of administrative work, as well as doing her part of the identifications. Mrs A. C. Fellingham, research technician, assisted with identifications and general herbarium work. Mrs Van Wyk and Mrs Fellingham were involved in a systematic survey of the De Hoop area under control of Krygkor, spending 4 days in the undercollected area every 4 to 6 weeks. PRE was asked to assist with identification of the specimens collected (mainly in D wing of PRE), as STE could not possibly cope with this extra load, for which identifications were needed urgently. Staff of the unit also took part in a collecting expedition to estuaries, which are being studied by the ecologists. Collections were made of a *Cliffortia* which may be a new species.

PLANT STRUCTURE AND FUNCTION DIVISION

The facilities of this division were considerably improved with the acquisition of an automatic image analysis system. Equipment for wood anatomical studies was also purchased to enable Mr P. P. J. Herman to commence his comparative studies of the southern African woody plants. Mrs J. C. P. Spangenberg left us during December after doing valuable work for the National Transport Commission on the cytogenetics of *Eragrostis curvula.*

Comparative grass leaf anatomy

An exciting discovery was made by Dr R. P. Ellis during a field trip to SWA/Namibia — *Eragrostis walteri* was found to be a C_3 plant. This is the first known non-Kranz member of the chloridoid subfamily. Further studies are being undertaken on plants transplanted into the greenhouses of the Pretoria National Botanical Garden.

Cytogenetic studies

Mr J. J. Spies and Mrs H. du Plessis have completed their work on *Rubus* and have submitted a series of five papers outlining their findings. The cytogenetics team has now turned its attention to grass cytogenetics and has begun a study of all the southern African grass species. This should prove invaluable, together with the leaf anatomical information, for the Poaceae volume of the *Flora of southern Africa.* A sound start has been made to this study and successful chromosomal preparations have been obtained from many different taxa.

VEGETATION ECOLOGY DIVISION

The former Ecology Section has now been formally separated into the Vegetation Ecology Division (under Dr J. C. Scheepers) and the Experimental Ecology Division (under Dr M. C. Rutherford). The functions of the Vegetation Ecology Division are to study the vegetation of South Africa and its ecological relations. This work involves three main aspects: the identification, description, classification and mapping of the various kinds of vegetation; study of the ecological relationships between different kinds of vegetation — with each other and with the environment — and of the various processes and mechanisms that determine the behaviour of plant communities; and the application of such ecological knowledge to the management and utilization of vegetational resources.

Transvaal bushveld and forest studies

In the preparatory phase of the research facet, 'The vegetation ecology of Sour Bushveld in the Transvaal Waterberg', Mr R. H. Westfall has developed computerized field data capture, improved methods to increase collecting efficiency, improved plant identification aids, and developed an objective approach to vegetation sampling. Problems associated with minimum sample area and the hierarchical nature of plant communities have been overcome. A pocket-sized apparatus was also developed for estimating both basal and canopy cover.

Refinement of the Braun-Blanquet phytosociological classification of vegetation in the Sabie area of the Eastern Transvaal Escarpment by Mr G. B. Deall resulted in 62 syntaxa arranged in an informal hierarchy, and comprising 53 plant communities (with 18 variants), 14 vegètation types and 4 ecological formation classes. Vegetation types were mapped. They appear to provide a useful basis for landscape classification of practical significance to land managers. Vegetation types were subsequently integrated with existing land-type map units to provide an alternative, broader basis for landscape classification.

Coastal studies

In the Kosi Bay – Sodwana area of KwaZulu, Dr P. J. Weisser found that first-priority sites for conservation of vegetation occur mainly on the dune barrier in the vicinity of Sibaya Lake. He discovered a previously unknown type of sand forest dominated by *Drypetes natalensis, Chrysophyllum viridifolium* and *Cola greenwayi* on the Mandosi Peninsula. After clearing in the course of *Pereskia aculeata* control, regeneration of vegetation is quick, the most common woody species being *Albizia adianthifolia, Dalbergia obovata* and *Tabernaemontana elegans.* Fig. 1.

Mr M. G. O'Callaghan has published articles on two estuarine systems in the Cape under the auspices of the Estuarine and Coastal Research Unit (CSIR). The vegetation ecology component of this project is being wound up and a final report is being prepared.

Cape fynbos studies

Classification and description of western coastal lowland fynbos by Mr C. Boucher is well advanced. The 137 plant communities identified are classified into a hierarchy of four orders, 10 alliances, 14 suballiances, 59 associations and 37 subassociations; 13 azonal wetland communities have not been ranked. The analysis of aerial photographs of selected sites indicated that the Sand Plain Fynbos and the West Coast Strandveld become invaded at similar but

FIG. 1. — Dune mining operation by Richards Bay Minerals north of Richards Bay. Foreground shows a previously mined and now rehabilitated area. The Botanical Research Institute is mapping vegetation before mining, to establish conservation priorities.

slower rates than West Coast Renosterveld and that annual manual eradication strategies can contain alien plant spread in West Coast Strandveld. Mr Boucher attended the MEDECOS Conference in Australia in 1984. This proved to be a very valuable experience. The plant ecological study of the Cape of Good Hope Nature Reserve by Mr H. C. Taylor was completed with the final editing of five papers which were published during the report year. Two papers in *Bothalia* gave an account of methods and an analytical and descriptive account of the vegetation. Three publications in the *South African Journal of Botany* comprised an analysis of the flora, and the results of a survey and subsequent monitoring of the spread of invasive alien woody plants. Mr D. J. McDonald has completed follow-up work on classification and description of the vegetation of Swartboskloof, Jonkershoek. Ordination of the vegetation data has yielded results which have re-inforced the conclusions drawn from the classification. Investigation of environmental gradients using detrended correspondence analysis showed that soil parent material has a major influence on the distribution of different plant communities, particularly in the Mountain Fynbos. The classification and description of the vegetation will serve as a basis for future experimental work at Swartboschkloof.

Preparatory work on ecological studies of mountain fynbos by Mr H. C. Taylor and Mr D. J. McDonald, in the Cedarberg and Langeberg respectively, is well under way.

Grassland studies

Miss B. J. Turner and Mr C. W. Ries have commenced preliminary work on two key study areas in the grasslands of the south-eastern and southern Transvaal. These key areas were selected for the range of variation that they contain and for the extrapolation value of the results.

EXPERIMENTAL ECOLOGY DIVISION

Fynbos germination studies

Miss F. M. Pressinger has investigated mechanisms to explain the sporadic nature of the germination of *Protea repens* seed in the western Cape. She has developed techniques to accelerate the germination of these seeds. Dr C. F. Musil has drawn up a detailed work plan to investigate the germination capacity of representative sets of fynbos and invasive alien plant species within mixed field communities.

Fynbos competition studies

A series of experiments to measure the effect of density, water regime and presence of *Acacia saligna* plants on the growth and performance of *Protea repens* seedlings has been completed and the results are being written up by Miss Pressinger.

Fynbos transformation studies

Mr G. W. Davis is assessing the effects of substrate disturbance on fynbos systems as a result of marginal cultivation of fynbos ornamental plants. Details of the vegetation and soils of the experimental site have been recorded and a fire has been applied and quantitatively characterized. Parallel laboratory studies on selected soils are under way.

Karoo research

Mr G. F. Midgley has completed the main part of an extensive literature survey of the plant growth and life forms of the winter rainfall area of the Karoo. This constitutes the basis for initial screening of plant forms for ecophysiological research on their main adaptations to water stress.

Biome studies

In a joint effort by the Experimental and Vegetation Ecology Divisions, Dr M. C. Rutherford and Mr R. H. Westfall have determined the biomes of southern Africa according to clearly defined criteria and methods. The objective result has led to re-assessment of previously recognized biomes and to clarification of biome borders. New perspectives on plant-environmental relations at biome scale have been obtained. These include the role of (1) the interaction of moisture and temperature, and (2) the interaction of moisture levels and moisture seasonality in explaining certain biotic distributions.

PLANT EXPLORATION DIVISION

The Division, under Mr M. J. Wells, completed its projects on timber sources and barrier plants, and is now concentrating entirely on food plant and weed research. Mr T. H. Arnold continues to lead the food plants research team although he was transferred in October to the Herbarium Division.

Barrier plants

The survey of barrier plants by Miss L. Henderson, which was completed in 1983/84, is still awaiting publication. It is scheduled to appear as a Botanical Survey Memoir during the 1986/87 financial year.

Indigenous food plants

A further 276 species were added to the national food plant databank by Mr A. A. Balsinhas. He also added to the information records of 538 species that were already on the list. The bank has proved its value by providing most of the information needed to compile a paper on Khoisan (Hottentot and Bushman) foodplants. This paper, prepared by Mr Arnold and Mr Wells was presented by the former, at the Kew International Conference on Economic Plants for Arid Lands (KICEPAL), London, 23–27 July, 1984. The paper was very well received, and resulted in South Africa being regarded as one of the countries leading in this field.

The research facet on indigenous food plants was given to Miss S. Chadwick, a contract worker from England, during June, 1984. She carried out intensive literature surveys on 14 priority species: *Acanthosicyos horridus, A. naudinianus, Coccinia adoensis, C. rehmannii, C. sessilifolia, Cucumis anguria, C. africanus, C. kalahariensis, C. metuliferus, Citrullus lanatus, Bauhinia petersiana, Tylosema esculentum, Guibourtia coleosperma* and *Vigna lobatifolia.* During this survey 586 literature references and

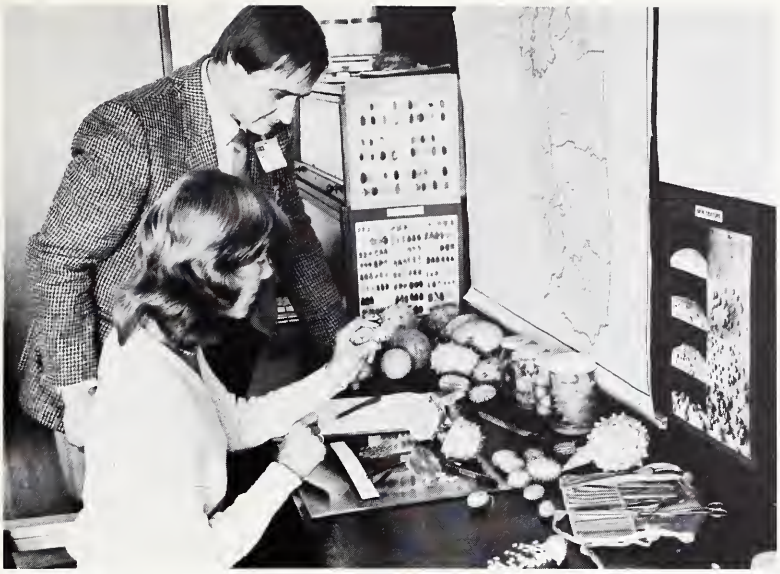

FIG. 2. — Researchers of the Botanical Research Institute, Pretoria, examining wild melons and cucumbers for evaluation as food plants of economic potential.

1 231 herbarium labels were consulted. Although writing up of the literature survey has not been completed, it was sufficiently advanced to provide a basis for fieldwork. One major field trip was made to the northern Cape and SWA/Namibia. More than 100 collections and many observations on the priority food plant species were made. Fig. 2.

Primitive crop plants of African origin

No field trips were undertaken but studies on the diversity of primitive crop plants were continued by Mrs K. J. Musil and Miss M. de Bruyn, using previously collected material.

Sorghum: 38 characters were recorded for 61 collections, bringing the total number of collections completed to 124. These are all backed by permanently mounted spikelet dissections. Recordings were made of the seed colour and tannin content of 118 collections, bringing the total number of collections examined to 352.

Pennisetum: 22 characters were recorded for 223 collections and a start was made with computer analysis of the results. A study of endosperm patterns showed that there are not 5 basic patterns, as reported in the literature. Seeds from a single inflorescence were found to exhibit up to 10 patterns.

Citrullus lanatus: sugar content was found to vary gradually from sweet to bitter types, via semi- and non-sweet intermediates. No significant differences in leaf-stomata number or position were found between the various types.

The relationship between crop frequency and preference was confirmed by analyses of data collected in Bophuthatswana during 1983/84.

Mr Arnold, who directed this work, presented a poster paper illustrating the wealth of diversity exhibited by primitive crops in South Africa, at the KICEPAL conference in London.

Conservation of germ plasm

Research on indigenous food plants and primitive crops yielded a total of 601 seed collections, i.e. *Citrullus lanatus* (347), other edible Cucurbitaceae (79), *Pennisetum americanum* (82), *Sorghum bicolor* (76), and others (17). Mrs Musil was responsible for preparing and annotating the seed for storage and for handling gifts and exchanges of material e.g. with ICRISAT in India.

Water conservation gardening

Mrs D. M. C. Fourie's semi-popular publication on water conservation gardening has proved so popular with the gardening public that it has had to be re-printed. Mrs Fourie has also given several talks on the subject, which is of great relevance in this time of drought.

Woody invaders

The results of a survey of exotic woody invaders in the Transvaal, carried out by Miss L. Henderson and Mrs K. J. Musil, have been published. This survey has revealed a disturbingly widespread and effective invasion of the veld by a wide range of exotics. These invaders threaten to change the landscape of grassy areas and to replace some indigenous woody communities such as streambank woodland.

National Weed List

Mrs H. Joffe completed data sheets for the remaining 934 species in the weed list, which consisted of about 1 600 species as at June, 1984. It was then found necessary to add about 100 species in order to include all those covered either by new herbicide registrations or by new legislation on weeds and invaders. Data sheets on all ± 1 700 species were checked by Mr Wells and encoded by Mrs Joffe and Miss L. Henderson. Camera-ready copy is being produced on the word processor/printer. The index to common names, compiled by Mr A. A. Balsinhas,

FIG. 3. — One of the massive specimens of *Aloe bainesii* donated by members of the public being planted at the Reynolds Gate of the Pretoria National Botanical Garden.

and the bibliography, compiled by Mrs K. J. Musil, are also ready for typing. Publication is scheduled for the end of 1985 or early 1986. An expanded data sheet for a second edition scheduled for production in several years's time, has been drawn up by Mr M. J. Wells.

PRETORIA NATIONAL BOTANICAL GARDEN

Under the curatorship of Mr D. H. Dry the following developments took place: Mr H. J. de Villiers and his staff landscaped and planted a woodland stream on the main ridge and completed the last link in a circular service road around the garden. Miss S. C. Kruger landscaped and supervised the planting of the koppies of the Karoo Biome, and the area in front of the Reynolds's gate. Huge specimens of *Aloe bainesii* donated by members of the public were planted to complement the aloe motif of the Reynolds's gates (Fig. 3). *Encephalartos* species were established in their specific biomes throughout the garden. To conserve water, all the streams have been re-sealed and a system of channelling rain water towards the main streams and dams has been devised. A start was made on reviewing and adjusting the landscaping in certain sections of the garden. Mr M. J. Wells and all technicians participated.

A total of 1 320 accessions, including 580 research accessions (mainly grasses including *Sorghum),* was received and accessioned by the records team: Mrs B. C. de Wet and Mrs K. P. Clarke. Mr D. S. Hardy collected 50 rare and endangered species for the new SWA/Namibia house. He also assisted Dr H. Glen with a taxonomic revision of the genus *Aloe.*

BOTANICAL RESEARCH INSTITUTE

Scientific, Technical and Administrative Staff
(31st March 1985)

Director

B. de Winter, M.Sc., D.Sc. (Taxonomy of Poaceae, especially *Eragrostis* and of *Hermannia*; plant geography)

Deputy Director

D. J. B. Killick, M.Sc., Ph.D., F.L.S. (General taxonomy, nomenclature, mountain ecology and editing)

ADMINISTRATION

Provisioning Administration Officer	Mrs D. J. Gerber
State Accountant	Mrs J. Rautenbach
Senior Provisioning Administration Clerks	Miss W. J. Geldenhuys
	Mrs S. Swanepoel
	Mrs I. A. Ebersohn
	Mrs F. V. Polak
Personal Secretary to Director	Mrs M. M. Loots
Senior Registration Clerks	Mrs M. W. E. Prinsloo
	Mrs I. J. Joubert*
Accounting Clerk	Mrs C. A. Bester*
Receptionist	Miss B. A. Language
Typists	Mrs S. S. Brink
	Mrs R. A. Steyn*
	Mrs S. M. Thiart*
	Mrs M. P. M. C. van der Merwe*
	Mrs J. M. Mulvenna

LIAISON SERVICES

Liason Officer	Mrs S. D. Hewitt, B.A. (Public relations)

BIOSYSTEMATICS DIVISION

Officer-in-Charge	O. A. Leistner, M.Sc., D.Sc., F.L.S. (Editorial)
Assistant Director	O. A. Leistner, M.Sc., D.Sc., F.L.S. (From November 1984)
Senior Technician: Editorial Assistant	Mrs B. A. Momberg, B.Sc.*

HERBARIUM DIVISION

Officer-in-Charge	T. H. Arnold, M.Sc. (from Oct. 1984)
(Acting)	Mrs E. van Hoepen, M.Sc. (until Sept. 1984)

NATIONAL HERBARIUM, PRETORIA (PRE)

Senior Agricultural Researcher	T. H. Arnold, M.Sc. (Curator; Supervision of identifications and enquiries)

Wing A (Pteridophytes–Monocotyledons)

Agricultural Researcher	Miss C. Reid, B.Sc. Hons (Cyperaceae)
Principal Research Technician	Miss L. Smook, B.Sc. (Poaceae)
Technical Assistants	Mrs S. J. C. Burger
	Mrs P. W. van der Helde
Provisioning Administration Clerk	Mrs C. van Niekerk* (from Jan. 1985)

Wing B (Piperaceae–Oxalidaceae)

Senior Agricultural Researcher	G. Germishuizen, M.Sc. (Polygonaceae)
Research Technician	Mrs B. J. Pienaar, B.Sc. Hons *(Vigna)*
Technical Assistant	Mrs A. C. Potgieter* (Until June 1984)
Laboratory Assistant	C. Letsoala

Wing C (Linaceae–Asclepiadaceae)

Senior Agricultural Researcher	Miss E. Retief, M.Sc. (Cucurbitaceae, fruit and seed collection)
Agricultural Researcher	Miss K. L. Immelman**, M.Sc. (from Feb. 1985)
Technical Assistants	Mrs J. I. M. Grobler*
	Mrs M. Z. Heymann* (until Nov. 1984)

Wing D (Convolvulaceae–Asteraceae)

Senior Agricultural Researcher	Miss W. G. Welman, M.Sc. (Asteraceae)
Senior Research Technician	Mrs M. J. A. W. Crosby*, B.Sc.
Laboratory Assistant	J. Phahla

* Half-day

** Part-time

Cryptogamic Herbarium

Assistant Agricultural Researchers	F. A. Brusse, M.Sc. (Lichens) J. van Rooy, B.Sc. Hons (Musci)
Principal Research Technician	Mrs S. M. Perold, B.Sc.* (SEM and laboratory work, Ricciaceae)
Technical Assistant	Mrs L. R. Filter*

Services

Agricultural Researcher	Mrs E. van Hoepen, M.Sc. (Controlling officer, from Oct. 1984)
Technical Assistants	Mrs M. Dednam* (Identification records) Mrs M. Z. Heymann* (loans and exchanges, from Dec. 1984)
Typist	Mrs A. M. Verhoef
Laboratory Assistant	G. Lephaka (Preparation and packing)

NATAL HERBARIUM, DURBAN (NH)

Assistant Agricultural Researcher	B. D. Schrire, B.Sc. Hons (Curator, Fabaceae)
Principal Research Technician	Mrs V. G. Coetzee, Ph.D.* (Until April 1984)
Senior Research Technician	Mrs M. Jordaan, B.Sc.* (Celastraceae, general identifications)
Provisioning Administration Clerk	Mrs H. E. Noble*
Laboratory Assistants	C. N. Buthelezi A. M. Ngwenya

ALBANY MUSEUM HERBARIUM, GRAHAMSTOWN (GRA)

Agricultural Researcher	Mrs E. Brink, B.Sc. (Curator, general identifications)
Assistant Agricultural Researcher	Mrs A. F. M. G. Jacot Guillarmod, D.Sc.*
Technical Assistant	Mrs M. L. Furlong*
Laboratory Assistant	A. D. Booi
Labourer	R. Klaas (Grahamstown Nature Reserve)

GOVERNMENT HERBARIUM, STELLENBOSCH (STE)

Agricultural Researchers	Mrs C. M. van Wyk, M.Sc. (Acting curator, general identifications)
Principal Research Technician	Mrs A. C. Fellingham, B.Sc. (General identifications)
Technical Assistants	Mrs J. Leith Miss E. van Wyk (from July 1984)
Clerical Assistant	Mrs J. van Wyk (neé Fourie)
Laboratory Assistant	C. Paulse

FLORA RESEARCH DIVISION

Officer-in-Charge	O. A. Leistner, M.Sc. D.Sc., F.L.S. (Until Oct. 1984)
(Acting)	G. E. Gibbs Russell, B.S., Ph.D. (From Nov. 1984)
Assistant Director	O. A. Leistner, M.Sc. D.Sc., F.L.S. (General taxonomy) (Until Oct. 1984)
Senior Agricultural Researchers	E. G. H. Oliver, M.Sc. (Taxonomy of Ericaceae) J. M. Anderson, M.Sc., Ph.D. (Palaeobotany, plant geography) H. F. Glen, M.Sc., Ph.D., F.L.S. (Mesembryanthemaceae, *Aloe*) G. E. Gibbs Russell, B.S., Ph.D. (Taxonomy of Poaceae, electronic data processing, plant geography)
Agricultural Researchers	Miss K. L. Immelman, M.Sc. (Taxonomy, especially *Justicia*) H. P. Linder, B.Sc., Ph.D. (Liaison Officer, Kew; taxonomy, especially Orchidaceae and Restionaceae) L. E. W. Codd, M.Sc., D.Sc. (Taxonomy, especially Lamiaceae; history of plant collecting) (Until Sept. 1984) Mrs A. A. Obermeyer (Mauve), M.Sc. (Taxonomy, especially Monocotyledons)

* Half-day

Research Technician	Mrs H. M. Anderson, M.Sc., Ph.D.* (Palaeobotany)
Graphic Artists	Mrs R. C. Holcroft*
	Miss G. C. Condy, M.A.
Technical Assistant	Mrs W. J. G. Roux*

Data Subdivision

Data Officer	G. E. Gibbs Russell, B.S., Ph.D. (Registers of scientific names, regional phytogeography)
Datametrician	N. P. Barker, B.Sc. Hons‡ (Database manager for PRECIS, system manager for Hewlett Packard, computer taxonomy, pollination ecology)
Research Technician	Mrs J. C. Mogford, B.Sc. Hons (Quality control of PRECIS)
Technical Assistants	Mrs J. H. Jooste (Chief encoder for PRECIS)
	Mrs E. B. Evenwel (Quality control and update encoding for PRECIS)
	Mrs H. P. van der Westhuizen (Data-capture and encoding for PRECIS)*

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	D. S. Hardy (Nursery supervision, succulents and orchids)
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Farm Foreman.....	H. N. J. de Beer
	L. C. Steenkamp

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Book Review

GRASSES OF THE SOVIET UNION, Parts I and II by N. N. TSVELEV, *New Delhi (India): Amerind Publishing Co.* for the Smithsonian Institution Libraries, and the National Science Foundation, Washington, D.C. 1983. (Original Russian edn published by Nauka Publishers, Leningrad, 1976). Pp. 1196, 25 black and white drawings.

This two volume taxonomic treatment of the Poaceae comprehensively covers the 1 011 species in 177 genera that are indigenous, naturalized and cultivated in the Soviet Union. There is an overall key to genera, but no key to tribes; and within each genus there are detailed keys to species that also serve as species descriptions. There are descriptions for each subfamily, tribe, subtribe, genus and section. Synonyms are given for tribes, genera, sections and species, but no type specimens are quoted for names in synonymy. For each genus, the type species, distribution in the world and in the USSR, and economic importance are recorded. Each species is treated briefly, with habitat and distribution in the Soviet Union, the type specimen and its location, and often the chromosome number with literature reference. A separate section at the end of the generic treatment deals with recorded hybrids, and hybrid genera are also treated in some detail, with observations on their origin.

The introductory material is nearly as comprehensive as the taxonomic treatment. There are well organized chapters on grass anatomy and morphology, including detailed discussions of caryopsis and embryo structure, roots, branching patterns, leaf structure and anatomy, and floral modifications. This section is concluded by a long summary of primitive and advanced character series in the grass family as a whole, and leads into a final introductory chapter on evolutionary directions in the Poaceae. The most recent literature cited is from the early 1970's, but all the review chapters are extremely interesting to a Western reader because they provide a synthesis of well known older literature with more recent Russian studies, to which references are seldom seen.

The classification at subfamily and tribal level is the only one known to me in which the two subfamilies Bambusoideae and Pooideae are recognized. All other subfamily systems in use in Europe, America and Africa accept either the two subfamilies Pooideae and Panicoideae or a number of subfamilies (usually including Bambusoideae, Arundinoideae, Chloridoideae, Panicoideae and Pooideae). In no other system beside that of Tsvelev are pooid and panicoid grasses united in the same subfamily. Unfortunately, there is a discrepancy between the information about grasses presented in the introductory chapters and the classification adopted in the taxonomic portion. An original and radically different classification system is presented, but the thinking behind it is not explained.

The species concept adopted in this work is explained to be that of the polytypic species that includes subspecific taxa roughly equivalent to the monotypic species concept used by Rozhevits (Poaceae in *Flora of the USSR*, 1934). For this reason, the number of species recognized for the area has decreased from 1 407 to just over 1 000.

The book was translated and published in India. Although generally the translation is acceptable, occasionally a phrase is awkwardly worded, or the word choice is less than ideal. For example, 'primitive' grasses are referred to as 'primary' grasses, and diaspores are said to be distributed by 'water streams.' A more serious inconvenience is found in the index. It refers not to the page numbers in the English edition, but to the original page numbers in the Russian edition, which are printed inconspicuously in various places along the page margins. This is mentioned only in a footnote on the first page of the index, and was located only after much fruitless searching for genera in the wrong places.

The treatment of the Poaceae for the Soviet Union is of much interest to agrostologists of other areas, and gratitude must be expressed to the Smithsonian Institution and the National Science Foundation for sponsoring the English edition.

G. E. GIBBS RUSSELL

Bothalia 16,1: 137–142 (1986)

A new guide for authors to Bothalia

O.A. LEISTNER

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EDITORIAL POLICY

Bothalia, the house journal of the Botanical Research Institute, welcomes original papers dealing with flora and vegetation of southern Africa and related subjects. Full-length papers and short notes, as well as book reviews, are accepted. Manuscripts may be written in either English or Afrikaans.

Articles are assessed by referees at the discretion of the editor. Authors are welcome to suggest possible referees to judge their work. Authors are responsible for the factual correctness of their contributions. *Bothalia* maintains an editorial board (see title page) to ensure that international standards are upheld.

PRESENTATION OF MANUSCRIPT

Manuscripts should be typewritten on one side of good quality A4-size paper, double-spaced throughout (including abstract, tables, captions to figures, literature references etc.) and have a margin of at least 30 mm all round. The original and three photocopies of all items, including text, illustrations, tables and lists should be submitted, and the author should retain a complete set of copies. Papers should conform to the general style and layout of recent issues of *Bothalia* (from Volume 14 onwards). Material should be presented in the following sequence: Title page with title, name(s) of author(s), keywords, abstract (in English and Afrikaans) and information that should be placed in a footnote on the title page, such as address(es) of author(s) and mention of granting agencies. The sequence continues with Introduction and Aims, Material and Methods, Results, Interpretation (Discussion), Acknowledgements, Specimens examined (in revisions and monographs), References, Index of names (recommended for revisions dealing with more than about 15 species), Tables, Captions for figures and figures. In the case of short notes and book reviews, keywords and abstracts are superfluous. All pages must be numbered consecutively beginning with the title page to those with references, tables and captions to figures.

AUTHOR(S)

When there are several authors the covering letter should indicate clearly which of them is responsible for correspondence and, if possible, telephonically available while the article is being processed. The contact address and telephone number should be mentioned if they differ from those given on the letterhead.

TITLE

The title should be as concise and as informative as possible. In articles dealing with taxonomy or closely related subjects the family of the taxon under discussion (see also *Names of taxa* under General, below) should be mentioned in brackets but author citations should be omitted from plant names.

KEYWORDS

Up to 10 keywords (or index terms) should be provided in English in alphabetical sequence. The following points should be borne in mind when selecting keywords:

1, Keywords should be unambiguous, internationally acceptable words and not recently-coined little-known words; 2, they should be in a noun form and verbs should be avoided; 3, they should not consist of an adjective alone; adjectives should be combined with nouns; 4, they should not contain prepositions; 5, the singular form should be used for processes and properties e.g. evaporation; 6, the plural form should be used for physical

objects e.g. augers; 7, location (province and/or country); taxa (species, genus, family) and vegetation type (community, veld type, biome) should be used as keywords; 8, keywords should be selected hierarchically where possible, e.g. both family and species should be included; 9, they should include terms used in the title; 10, they should answer the following questions: 10.1, what is the *active concept* in the document (activity, operation or process); 10.2, what is the *passive concept* or object of the active process (item on which the activity, operation or process takes place); 10.3, what is the means of accomplishment or how is the active concept achieved (technique, method, apparatus, operation or process); 10.4, what is the environment in which the active concept takes place (medium, location) and 10.5, what are the independent (controlled) and dependent variables?; 11, questions 10.1 to 10.3 should preferably also be answered in the title.

ABSTRACT

Abstracts of no more than 200 words should be provided in English and Afrikaans. Abstracts are of great importance and should convey the essence of the article. They should refer to the geographical area concerned and, in taxonomic articles, mention the number of taxa treated. They should not contain information not appearing in the article. In articles dealing with taxonomy or closely related subjects all taxa from the rank of genus downwards should be accompanied by their author citations. Names of new taxa and new combinations should not be underlined. If the article deals with too many taxa only the important ones should be mentioned.

TABLE OF CONTENTS

A table of contents should be given for all articles longer than about six typed pages, unless they follow the strict format of a taxonomic revision.

ACKNOWLEDGEMENTS

Acknowledgements should be kept to the minimum compatible with the requirements of courtesy. Please give all the initials of the person(s) you are thanking.

LITERATURE REFERENCES

In text

Literature references in the text should be cited as follows: 'Jones & Smith (1986) stated . . .' or ' . . . (Jones & Smith 1986)' when giving a reference simply as authority for a statement. When more than two authors are involved use the name of the first author followed by *et al*. Titles of books and names of journals should preferably not be mentioned in the text. If there is good reason for doing so, they should be treated as described in the paragraph *In reference list* below. Personal communications are given only in the text, not in the list of references. Please add the person's full initials to identify the person more positively.

Within synonymy in taxonomic articles

The correct name (not underlined) is to be followed by its author citation (underlined) and the full literature reference, with the name of the publication written out in full. Thereafter all literature references need only reflect author, page and year of publication, e.g. C.E. Hubb. in Kew Bulletin 15: 307 (1960); Boris *et al.*: 14 (1966); Boris: 89 (1967); Sims: t. 38 (1977). Note that (1) references are arranged in chronological sequence; (2) where two or more references by the same author are listed in succession, the author's name is repeated with every reference; (3) names of authors are written in the same way (see *Names of authors of plant names* under General), irrespective of whether the person in question is cited as the author of a plant name or of a publication; (4) the word 'figure' is written as 'fig.', and 't.' is used for both 'plate' and 'tablet'.

Literature references providing good illustrations of the species in question may be cited in a paragraph commencing with the word Icones followed by a colon. This paragraph is given after the last paragraph of the synonymy.

In reference list

All publications referred to in the text, including those mentioned in full in the treatment of correct names in taxonomic papers, but no others, and no personal communications, are listed at the end of the manuscript under the heading References. The references are arranged alphabetically according to authors and chronologically under each author, with a, b, c, etc. added to the year if the author has published more than one work in a year. If an author has published both on his own and as a senior author with others, the solo publications are listed first and after that, in strict alphabetical sequence, those published with one or more other authors. Author names are typed in capitals. Titles of journals and of books are written out in full and are underlined as follows: *Transactions of the Linnean Society of London* 5: 171–217 or *Biology and ecology of weeds*: 24. Titles of books should be given as in *Taxonomic literature* edn 2 by Stafleu & Cowan and names of journals as in *World list of scientific periodicals,* edn 4. If the same author is mentioned more than once the name is written out in full and not replaced by a line.

Examples of references:

Collective book or Flora

BROWN, N.E. 1909. Asclepiadaceae. In W.T. Thiselton-Dyer, *Flora capensis* 6,2: 518–1036. Reeve, London.

BROWN, N.E. 1915. Asclepiadaceae. In W.T. Thiselton-Dyer, *Flora of tropical Africa* 5,2: 500–600. Reeve, London.

Book

DU TOIT, A.L. 1966. *Geology of South Africa,* 3rd edn, S.M. Haughton (ed.). Oliver & Boyd, London.

HUTCHINSON, J. 1946. *A botanist in southern Africa.* Gawthorn, London.

Journal

MORRIS, J.W. 1969. An ordination of the vegetation of Ntshongweni, Natal. *Bothalia* 10: 89–120.

STEBBINS, G.L. Jr 1952. Aridity as a stimulus to plant evolution. *American Naturalist* 86: 35–44.

In press, in preparation

TAYLOR, H.C. in press. *A reconnaissance of the vegetation of Rooiberg State Forest.* Department of Forestry, Technical Bulletin.

VOGEL, J.C. 1982. The age of the Kuiseb River silt terrace at Homeb. *Palaeoecology of Africa* 15. In press.
WEISSER, P.J., GARLAND, J.F. & DREWS, B.K. in prep. Dune advancement 1937–1977 and preliminary vegetation succession chronology at Mlalazi Nature Reserve, Natal South Africa. *Bothalia*.

Thesis

KRUGER, F.J. 1974. *The physiography and plant communities of the Jakkalsrivier Catchment.* M.Sc. (Forestry) thesis, University of Stellenbosch.

Miscellaneous paper, report, unpublished article, technical note, congress proceedings

ANON. no date. *Eetbare plante van die Wolkberg.* Botanical Research Unit, Grahamstown. Unpublished.
BAWDEN, M.G. & CARROL, D.M. 1968. *The land resources of Lesotho.* Land Resources Study No. 3, Land Resources Division, Directorate of Overseas Surveys, Tolworth.
BOUCHER, C. 1981. Contributions of the Botanical Research Institute. In A.E.F. Heydorn, *Proceedings of workshop research in Cape estuaries*: 105–107. National Research Institute for Oceanology, CSIR, Stellenbosch.
NATIONAL BUILDING RESEARCH INSTITUTE 1959. *Report of the committee on the protection of building timbers in South Africa against termites, woodboring beetles and fungi.* 2nd edn, CSIR Research Report No. 169.

TABLES

Each table should be presented on a separate sheet and be assigned an Arabic numeral, i.e. the first table mentioned in the text is marked 'Table 1'. In the captions of tables the word 'table' is written in capital letters. See recent numbers of *Bothalia* for the format required. Avoid vertical lines, if at all possible. Tables can often be reduced in width by interchanging primary horizontal and vertical heads.

FIGURES

General

Figures should be planned to fit, after reduction, into a width of either 80, 118 or 165 mm, with a maximum vertical length of 240 mm. Allow space for the caption in the case of figures that will occupy a whole page. It is recommended that drawings should be twice the size of the final reproduction. Lettering and numbering on all figures should be done in letraset, stencilling or a comparable method. If symbols are to be placed on a dark background it is recommended that black symbols are used on a small white disk or square. If the lettering or wording on a figure is to be done by the printer this information must be typed or neatly printed on a photocopy of the figure or on an overlay attached to the original. If several illustrations are treated as components of a single composite figure they should be designated by capital letters. In captions and text the figure reference is then written as in the following example: 'Figure 4A' or 'Figure 7C, D, G'. Magnification of figures should be given for the size as submitted. It is recommended, however, that scale bars or lines be used on figures. In figures accompanying taxonomic papers, voucher specimens should be given in the relevant caption. Figures are numbered consecutively with Arabic numerals in the order they are referred to in the text. These numbers, as well as the author's name and an indication of the top of the figure, must be written in soft pencil on the back of all figures. Captions for figures should be collected together and typed on a separate sheet headed *Captions for figures.* A copy of the relevant caption should be attached to the base of each figure. Authors should indicate in pencil in the text where they would like the figures to appear. Authors wishing to have the originals of figures returned must inform the editor in the original covering letter and must mark each original 'To be returned to author'. Authors wishing to use illustrations already published must obtain written permission before submitting the manuscript and inform the editor of this fact. Note that the word 'figure' should be written out in full, both in the text and the captions.

Black and white drawings

Line drawings, including graphs and diagrams, should be in jet-black Indian ink, preferably on bristol board or tracing film. Lines should be bold enough to stand reduction.

Photographs

Photographs should be of excellent quality on glossy paper with clear detail and moderate contrast. Photograph mosaics should be submitted complete, the component photographs mounted neatly on a white card base leaving a narrow gap of uniform width between each print. Note that grouping photographs of markedly divergent contrast results in poor reproductions.

Dot maps

It is strongly recommended that taxonomic articles include dot maps as figures to show the distribution of taxa. Blank maps are available from the editor.

GENERAL

Names of taxa

As a rule authors should use the names as listed by Gibbs Russell *et al.* in *Memoirs of the Botanical Survey of South Africa* Nos 48 and 51. Names of genera and infrageneric taxa are usually underlined with the author citation (where relevant) not underlined. Exceptions include names of new taxa in the abstracts, correct names given in the synopsis or in paragraphs on species excluded from a given supraspecific group in taxonomic articles, in checklists and in indices, where the position is reversed, correct names being not underlined and synonyms underlined. Names above generic level are not underlined. In articles dealing with taxonomy and closely related subjects the complete scientific name of a plant (with author citation) should be given at the first mention in the text. The generic name should be abbreviated to the initial thereafter, except where intervening references to other genera with the same initial could cause confusion.

Names of authors of plant names

These should agree with the list compiled by the BRI (TN TAX 2/1) which has also been implemented by Gibbs Russell *et al.* in *Memoirs of the Botanical Survey of South Africa* Nos 48 and 51. Modern authors not included in the list should use their full name and initials when publishing new plant

names. Other author names not in the list should be in agreement with the recommendations of the Code.

Names of authors of publications

These are written out in full except in the synonymy in taxonomic articles where they are treated like names of authors of plant names.

Names of plant collectors

These are underlined whenever they are linked to the number of a specimen. The collection number is also underlined, e.g. *Acocks 14407.* Surnames beginning with 'De', 'Du' or 'Van' begin with a capital letter unless preceded by an initial.

Measurements

Use only units of the International System of Units (SI). Cm should not be used, only mm and/or m. The use of '±' is recommended.

Numerals

Numbers 'one' to 'nine' are spelled out in normal text and from 10 onwards they are written in Arabic numerals. In descriptions of plants, numerals are used throughout. Write 2,0–4,5 (not 2–4,5). When counting members write 2 or 3 (not 2–3).

Abbreviations

Abbreviations should be used sparingly but consistently. No full stops are placed after abbreviations ending with the last letter of the full word (e.g. edition = edn; editor = ed.), after units of measure, after compass directions and after herbarium designations.

Herbarium voucher specimens

Wherever possible authors should refer to one or more voucher specimen(s) in a registered herbarium.

KEYS TO TAXA

It is recommended that (apart from multi-access keys) indented keys be used with couplets numbered 1a–1b, 2a–2b, etc. (without full stops thereafter). Keys consisting of a single couplet have no numbering. Manuscripts of keys should be presented as in the following example:

1a Leaves closely arranged on an elongated stem; a submerged aquatic with only the capitula exserted ..... 1b. *E. setaceum* var. *pumilum*

1b Leaves in basal rosettes; stems suppressed; small marsh plants, ruderals or rarely aquatics:

2a Annuals, small, fast growing pioneers, dying when the habitat dries up; capitula without coarse white setae; receptacle cylindrical:

3a Anthers white ..... 2. *E. cinereum*

3b Anthers black ..... 3. *E. nigrum*

2b Perennials, more robust plants; capitula sparsely to densely covered with short setae:

SPECIES TREATMENT IN TAXONOMIC PAPERS

General presentation

The procedure to be followed is illustrated in the example (under Description and example of species treatment, below) which should be referred to, because not all steps are described in full detail. The correct name (see also *Names of taxa,* under General), with its literature citations is followed by the synonymy (if any), the description and the discussion, which should consist of paragraphs commencing, where possible, with italicised leader words such as *flowering time, diagnostic characters, distribution and habitat.*

Numbering

When more than one species of a given genus is dealt with in a paper, the correct name of each species should be prefixed by a sequential number followed by a full stop, the first line of the paragraph to be indented. Infraspecific taxa are marked with small letters, e.g. lb., 12c., etc.

Literature references within synonymy

(See above under *Literature references,* paragraph 2).

Citation of specimens

Type specimen in synopsis

The following should be given (if available): country (if not in RSA), province, locality as given by original collector, modern equivalent of collecting locality in square brackets (if relevant), date of collection (optional), collector's name and collecting number (both underlined). The abbreviation *s.n. (sine numero)* is given after the name of a collector who usually assigned numbers to his collections but did not do so in the specimen in question. The herbaria in which the relevant type(s) are housed are indicated by means of the abbreviations given in the latest edition of *Index Herbariorum.* The holotype (holo.) and its location are mentioned first, followed by a semicolon, the other herbaria are arranged alphabetically, separated by commas. Authors should indicate by means of an exclamation mark (!) which of the types have been personally examined. If only a photograph or microfiche was seen, write as follows: *Anon 422* (Z, holo.–BOL, photo.!). Lectotypes or neotypes should be chosen for correct names without a holotype. It is not necessary to lectotypify synonyms. When a lecto- or a neotype are newly chosen this should be indicated by using the

phrase 'here designated'. If reference is made to a previously selected lectotype or neotype, the name of the designating author and the literature reference should be given. In cases where no type was cited and none has subsequently been nominated this may be stated as 'not designated'.

In notes and brief taxonomic articles

In brief papers mentioning only a few species and a few cited specimens the specimens should be arranged according to the grid reference system:

Provinces/countries (typed in capitals) should be cited in the following order: SWA/Namibia, Botswana, Transvaal, Orange Free State, Swaziland, Natal, Lesotho, Transkei and Cape. Grid references should be cited in numerical sequence. Locality record for specimens should preferably be given to within a quarter-degree square. Records from the same one-degree square are given in alphabetical order i.e. (–AC) precedes (–AD), etc. Records from the same quarter-degree square are arranged alphabetically according to the collectors's names; the quarter degree references must be repeated for each specimen cited. The relevant international code of the herbaria in which a collection was seen should be given in brackets after the collection number; the codes are separated by commas. The following example will explain the procedure:

NATAL.—2731 (Louwsburg): 16 km E of Nongoma (–DD), *Pelser 354* (BM, K, PRE); near Dwarsrand, *Van der Merwe 4789* (BOL, M). 2829 (Harrismith): near Groothoek (–AB), *Smith 234;* Koffiefontein (–AB), *Taylor 720* (PRE); Cathedral Peak Forest Station (–CC), *Marriot 74* (KMG); Wilgerfontein, *Roux 426.* Grid ref. unknown: Sterkstroom, *Strydom 12* (NBG).

For records from outside southern Africa authors should use degree squares without names, e.g.:

KENYA.—0136: Nairobi plains beyond race course, *Napier 485.*

If long lists of specimens are given, they should be dealt with as below.

In monographs and revisions

In the case of all major works of this nature it is assumed that the author has investigated the relevant material in all major herbaria and that he has provided the specimens seen with determinavit labels. It is assumed further that the author has submitted distribution maps for all relevant taxa and that the distribution has been described briefly in words in the text. Under the heading 'Vouchers' no more than 5 specimens should be cited, indicating merely the collector and the collector's number (both underlined). Specimens are alphabetically arranged according to collector's name. If more than one specimen by the same collector is cited, they are arranged numerically and separated by a semicolon. The purpose of the cited specimens is not to indicate distribution but to convey the author's concept of the taxon in question.

The herbaria in which the specimens are housed are indicated by means of the abbreviation given in the latest edition of *Index Herbariorum*. They are given between brackets, arranged alphabetically and separated by commas behind every specimen as in the following example:

Vouchers: *Fischer 840* (NH, NU, PRE); *Flanagan 831* (GRA, PRE); *Marloth 4926* (PRE, STE); *Schelpe 6161* (BOL); *Schlechter 4451* (BM, BOL, GRA, K, PRE).

All specimens studied by the author should be listed together at the end of the article under the heading *Specimens examined.* They are arranged alphabetically by the collector's name and then numerically for each collector. The species is indicated in brackets by the number that was assigned to it in the text and any infraspecific taxa by a small letter. This is followed by the international herbarium designation. Note that the name of the collector and the collection number are underlined:

Acocks 12497 (21b) BM, K, PRE; *14724* (13a) BOL, K, P. *Archer 1507* (4) BM, G.

Burchell 2847 (8c) BM, K. *Burman 2401* (3) MO, S. *Burtt 789* (6) B, KMG, STE.

Synonyms

In a monograph or a revision covering all of southern Africa all synonyms based on types of southern African origin or used in southern African literature should be included. Illegitimate names are designated by *nom. illeg.* after the reference, followed by *non* with the author and date, if there is an earlier homonym. *Nomina nuda (nom. nud.)* and invalid names are excluded unless there is a special reason to cite them, for example if they have been used in prominent publications.

Synonyms should be arranged chronologically into groups of nomenclatural synonyms, i.e. synonyms based on the same type, and the groups should be arranged chronologically by basionyms, except for the basionym of the correct name which is dealt with in the paragraph directly after that of the correct name. When a generic name is repeated in a given synonymy it should be abbreviated to the initial except where intervening references to other genera with the same initial could cause confusion.

Description and example of species treatment

Descriptions of all taxa of higher plants should, where possible, follow the sequence: Habit; sexuality; underground parts (if relevant). *Indumentum* (if it can be easily described for the whole plant). *Stems/branches. Bark. Leaves*: arrangement, petiole absent/present, pubescence; blade: shape, size, apex, base, margin; midrib: above/below, texture, colour; petiole; stipules. *Inflorescence*: type, shape, position; bracts/bracteoles. *Flowers*: shape, sex. *Receptacle. Calyx. Corolla. Disc. Androecium. Gynoecium. Fruit. Seeds. Chromosome number.* Figure (word written out in full) number. As a rule shape should be given before measurements. In general, if an organ has more than one of the parts being described, use the plural, otherwise use the singular, for example, petals of a flower but blade of a leaf. Language must be as concise as possible, using participles instead of verbs. Dimension ranges should be cited as in the example below. Care must be exercised in the use of dashes and hyphens: a *hyphen* is a short stroke joining two syllables of a word, e.g. ovate-lanceolate or sea-green; an *N-dash (en)* is a longer stroke commonly used instead of the word 'to' between numerals, '2–5 mm long (do not use it between words but rather use the word 'to', e.g.

'ovate to lanceolate'), it is produced on a typewriter by typing 2 hyphens next to each other; and an *M-dash (em)* is a stroke longer than an N-dash and is used variously, e.g. in front of a subspecific epithet instead of the full species name, it is produced on a typewriter by typing 3 hyphens next to one another. The use of '±' is recommended when describing shape, measurements, dimensions etc.

Example:

1. **Bequaertiodendron magalismontanum** *(Sond.) Heine & Hemsl.* in Kew Bulletin: 307 (1960); Codd: 72 (1964); Elsdon: 75 (1980). Type: Transvaal, Magaliesberg, *Zeyher 1849* (S, holo.—BOL, photo.!).

Chrysophyllum magalismontanum Sond.: 721 (1850); Harv.: 812 (1867); Engl.: 434 (1904); Bottmar: 34 (1919). *Zeyherella magalismontanum* (Sond.) Aubrév. & Pelegr.: 105 (1958); Justin: (1973).

Chrysophyllum argyrophyllum Hiern: 721 (1850); Engl.: 43 (1904). *Boivinella argyrophylla* (Hiern) Aubrév. & Pellegr.: 37 (1958); Justin: 98 (1973). Types: Angola, *Welwitsch 4828* (BM!, lecto., here designated; PRE!); Angola, *Welwitsch 4872* (BM!).

Chrysophyllum wilmsii Engl.: 4, t. 16 (1904); Masonet: 77 (1923); Woodson: 244 (1937). *Boivinella wilmsii* (Engl.) Aubrév. & Pellegr.: 39 (1958); Justin: 99 (1973). Type: Transvaal, Magoebaskloof, *Wilms 1812* (B, holo.; K!, P! lecto. designated by Aubrév. & Pellegr.: (1958), PRE!, S!, W!, Z!).

Bequaertiodendron fruticosa De Wild.: 37 (1923), non Bonpland: 590 (1823); Bakker: 167 (1929); Fries: 302 (1938); Davy: 640 (1954); Breytenbach: 117 (1959); Clausen: 720 (1968); Palmer: 34 (1969). Type: Transvaal, Tzaneen Distr., *Granville 3665* (K!, holo.; G!, P!, PRE!, S!).

Bequaertiodendron fragrans auct. non Oldeman: Glover: 149, t. 19 (1915); Henkel: 226 (1934); Stapelton: 6 (1954).

Icones: Harv.: 812 (1867); Henkel: t. 84 (1934); Codd: 73 (1964); Palmer: 35 (1969).

Woody perennial; main branches up to 0,4 m long, erect or decumbent, grey woolly-felted, leafy. *Leaves* 3–10 (–23) × 1,0–1,5 (–4,0) mm, linear to oblanceolate, obtuse, base broad, half-clasping. *Heads* heterogamous, campanulate, 7–8 × 5 mm, solitary, sessile at tip of axillary shoots; involucral bracts in 5 or 6 series, inner exceeding flowers, tips subopaque, white, very acute. *Receptacle* nearly smooth. *Flowers* ± 23–30, 7–11 male, 16–21 bisexual, yellow, tipped pink. *Achenes* ± 0,75 mm long, elliptic. *Pappus* bristles very many, equalling corolla, scabridulous. *Chromosome number*: 2n = 22. Figure 23B.

New taxa

The name of a new taxon must be accompanied by at least a Latin diagnosis. Authors should not provide full-length Latin descriptions unless they have the required expertise in Latin at their disposal. It is recommended that descriptions of new taxa be accompanied by a good illustration (line drawing or photograph) and a distribution map.

Example:

109. **Helichrysum jubilatum** *Hilliard*, sp. nov. *H. alsinoidei* DC. affinis, sed foliis ellipticis (nec spatulatis), inflorescentiis compositis a foliis non circumcinctis, floribus femineis numero quasi dimidium hermaphroditorum aequantibus (nec capitulis homogamis vel floribus femineis 1–3 tantum) distinguitur.

Herba annua e basi ramosa; caules erecti vel decumbentes, 100–250 mm longi, tenuiter albo-lanati, remote foliati. *Folia* plerumque 8–30 × 5–15 mm, sub capitulis minora, elliptica vel oblanceolata, obtusa vel acuta, mucronata, basi semi-amplexicauli, utrinque cano-lanato-arachnoidea. *Capitula* heterogama, campanulata, 3,5–4 × 2,5 mm, pro parte maxima in paniculas cymosas terminales aggregata; capitula subterminalia interdum solitaria vel 2–3 ad apices ramulorum nudorum ad 30 mm longorum. *Bracteae involucrales* 5-seriatae, gradatae, exteriores pellucidae, pallide stramineae, dorso lanatae, seriebus duabus interioribus subaequalibus et flores quasi aequantibus, apicibus obtusis opacis niveis vix radiantibus. *Receptaculum* fere laeve. *Flores* ± 35–41. *Achenia* 0,75 mm longa, pilis myxogenis praedita. *Pappi* setae multae, corollam aequantes, apicibus scabridis, basibus non cohaerentibus.

TYPE.—Cape, Namaqualand Division, Richtersveld, ± 5 miles E of Lekkersing on road to Stinkfontein, kloof in hill south of the road, annual, disc whitish, 7 xi 1962, *Nordenstam 1823* (S, holo.; E, NH, PRE).

PROOFS

Only galley proofs are normally sent to authors. They should be corrected in red ink and be returned to the editor as soon as possible.

REPRINTS

Authors receive 100 reprints gratis. If there is more than one author, this number will have to be shared between them.

DOCUMENTS CONSULTED

Guides to authors of the following publications were made use of in the compilation of the present guide: *Annals of the Missouri Botanic Garden, Botanical Journal of the Linnean Society, Bothalia, Flora of Australia, Smithsonian Contributions to Botany, South African Journal of Botany* (including drafts of a formula for taxonomic papers submitted to that journal), *South African Journal of Science.*

ADDRESS OF EDITOR

Manuscripts should be submitted to: The Editor, Bothalia, Botanical Research Institute, Private Bag X101, Pretoria 0001.

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